

Appendix L

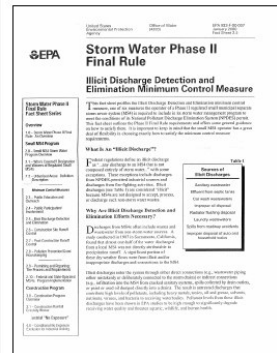
Powerpoint Slides Used in Training Programs

Powerpoint Presentation Slides Used for BMP 6-1.a Training of Streets, Sewer Collections, and Street Sweeping Personnel

Stormwater For Streets, Sewer Collections and Street Sweeping Personnel



The NPDES Stormwater Permit



The permit has six elements:

1. Public Education
2. Public Involvement
3. Illicit Discharge Detection /Elimination
4. Construction
5. New Development
6. Good Housekeeping

Monterey Regional Stormwater Management Plan

Submitted to RWQCB in 2003
Adopted by the RWQCB in 2006



Member Agencies

City of Pacific Grove
City of Monterey
City of Seaside
City of Sand City
City of Del Rey Oaks
City of Marina
County of Monterey
Carmel By The Sea



So, What Do We Need To Do To Comply With The Plan?

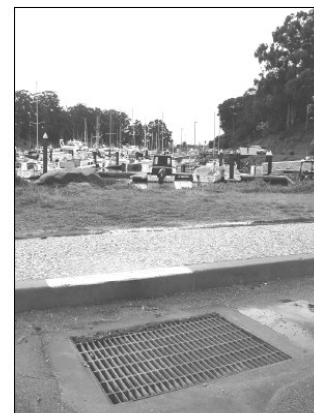
The MRSWMP has six Management Control Measures:

1. Public Education
2. Public Involvement
3. Illicit Discharge Detection /Elimination
4. Construction
5. New Development/Redevelopment Management
6. Pollution Prevention/Good Housekeeping



Rule No. 1
Nothing But
Rainwater
Goes To The
Storm Drain

BTW. There's
Only One Rule



Road Repairs



Road Repair Do's and Don'ts



- Keep all repair sites clean. Sweep frequently, especially on bridge and major road projects



Keep wastes out of drains



Protecting Drain Inlets



Make sure you provide protection for drain inlets around the work site. If you use sand bags, check them each day and replace if torn. Do not leave them behind after the projects is completed.



Washing Vehicles and Equipment



Proper Storage of Hazardous Materials and Disposal Of Hazardous Wastes



Waste Oil



Know Where To Dispose Of It Correctly



Regular Street Sweeping



Examples Of Local Programs

Pacific Grove
Downtown – 2X/Week
Main Arterials-Weekly
Residential – Monthly

Monterey
Business District & Cannery Row
– Daily
Residential 2X/Month

Sand City – Every Tuesday

Seaside 2X/ Month

Marina Weekly

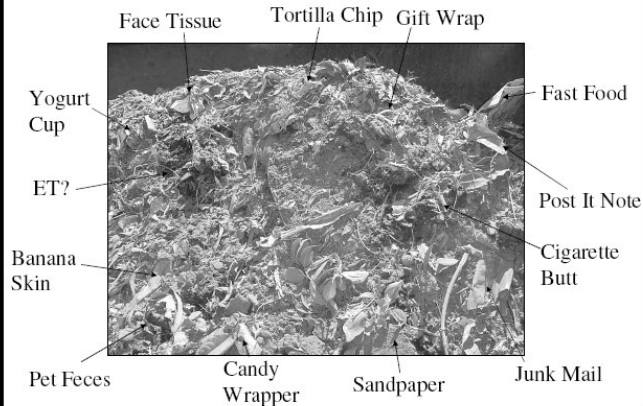
Parking Lots



All municipal parking structures and lots must be inspected for trash and debris weekly. All trash to be removed.

All facilities with over 150 spaces must be cleaned every week using a combination of blowers and sweepers, unless the facility has an effective treatment system installed.

Ketley's Guide To Common Street Sweepings



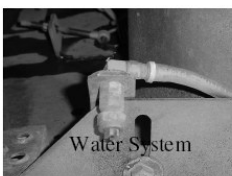
Street Sweeping Do's and Don'ts



Curbside Operating Speed

Same as Grandma Merging on the Freeway
5 MPH

Maintaining Equipment For Optimum Performance



Proper Disposal of Collected Materials





Getting Into The Gutter

Even in high density areas, you can get the community to keep the street clear for sweeping

Sewer Collections



Look After Your Lift Stations



Storm Drain Hot Spots

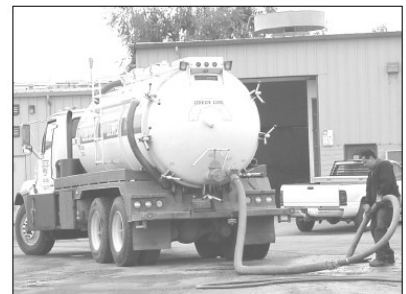


Get to know your problem areas. Make sure to clean those areas and SD inlets before the rains begin

Sewers Prefer a Low Fat Diet and Regular Movements.



Interceptors Need To Be Pumped



Deal With Excess Flows Due to I&I



Trash Enclosures



All enclosures that serve municipal buildings must be inspected every time trash/recyclables are removed. Any trash that is left after disposal shall be picked up immediately.

New enclosures for municipal buildings with food services shall drain to a sanitary sewer and have a hose bib readily available.

People Are Looking At What We Put In the Storm Drains



Clearly We Have a Lot To Do. If You Forget The Specifics Just Remember:



Simply Apply Rule Number

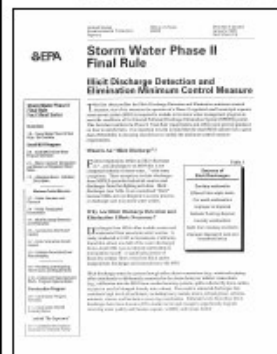
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**Powerpoint Presentation Slides Used for BMP 6-1.a Training of Custodial,
Parks, and Vehicle Maintenance Personnel**



Stormwater Training For Custodial, Parks and Vehicle Maintenance Folks

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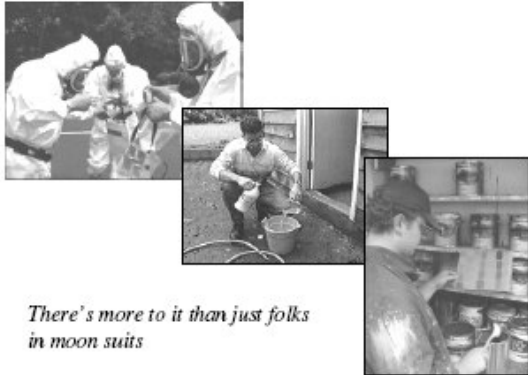


Rule No. 1
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BTW.
There's
Only 1 Rule



Hazmat Matters



*There's more to it than just folks
in moon suits*

Whenever Possible Substitute With Safer Products



Read The MSDS

Acute Toxicity: Fish:	LC ₅₀ (rainbow): 0.35 mg/L (96-hour)
LC ₅₀ (bluegill): 0.60 mg/L (96-hour)	
Acute Toxicity: aquatic invertebrates:	EC ₅₀ (daphnia sp.): 1.2 mg/L (48-hour)
13. DISPOSAL CONSIDERATIONS	
Triple rinse (or equivalent). Then offer for recycling or reclamation, or incineration and disposal of the residue, as well as any impurities, in a facility approved by State and local authorities, by burning. If liquid, may not be poured. Wastes resulting from use may be disposed of on site or at an approved waste disposal facility.	
14. TRANSPORTATION INFORMATION	
DOT/ADR Description:	Not applicable
Freight Classification:	Insecticides NQ other than pos see HMW Class 122120, Class 60
15. REGULATORY INFORMATION	
CERCLA (Superfund):	Not regulated
RCRA:	Not regulated as hazardous
SARA 311/312 HAZARD CATEGORIES:	
Immediate Health:	Yes (Irritant)
Delayed Health:	No

Storage and Disposal of All Chemicals



Landscaping and Lawn Care Stuff



Spraying?

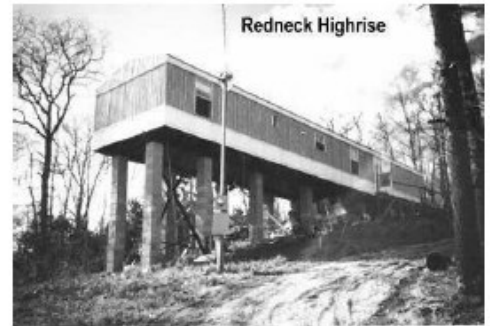


- Not When Rain is Predicted
- Keep Away From Watercourses
- Use Exactly as Described on MSDS
- Mix Only What You Need For The Job

Use IPM Methods Whenever Feasible



Erosion Control



How To Drain A Swimming Pool



Remember Rule No 1.
Drain to a sanitary sewer
only.

Get the OK from the
sanitation district first.

Vehicle Maintenance



All Work Needs To Be Done Under a Roof Or Cover. Never Clean Parts or Equipment Outside



Any
Equipment
Or Materials
With A
High
Spill/Leak
Risk Should
Be Stored
Under
Cover





Inspect Vehicle Service Facilities Regularly

All leaking vehicles indoors?
 All hazardous materials in proper storage?
 Spill kits fully stocked?
 All dust, metal filings and used absorbent collected and properly disposed of?
 Drip pans in place?
 Storm drains inspected and cleaned?

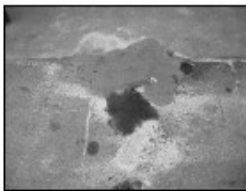
A Checklist Is Available

Spill Control (Note: The Best Spill Control is Prevention)	Y E S	N O	OTHER
Is the spill response plan maintained and kept current, and are all employees trained on the elements of the plan?			
Is the distance between waste collection points and storage area as minimum 4?			
Are all solid and liquid waste contained and covered, especially during transfer?			
Are absorbent materials purchased and maintained in accordance with local regulations and procedures for containment and cleanup of different spills?			
Are they readily accessible from anywhere in the shop?			
Are the leaks and drips spots cleaned routinely?			
Are the floor drains checked to ensure that they are not connected to or discharge to the storm drain system?			

Waste Oil



Know Where To Dispose Of Oil and Oil Filters Correctly



The Drains By The Garage Should Not Look Like This



Washing Vehicles and Equipment



Only Wash Equipment and Vehicles Where the Wastewater Goes To A Sanitary Sewer



Dumpsters. Make Sure They are Located Where You Need Them and Close the Lids



Cover Spoil/Sand Piles



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1

Course Outline and Powerpoint Presentation Slides Used for BMP 6-4.a
Training of Municipal Staffs on Proper Procedures for Managing Landscape
and Lawn Care Activities

URBAN - AG ECOLOGY

28 March 2007

CURRICULUM OUTLINE IPM and Irrigation Management Training

Training Duration: 4 hours

Training Topics:

5 minutes	<u>Introduction</u> Purpose of meeting Pre-knowledge survey	
30 minutes	<u>Irrigation</u> Irrigation 'must knows' System output System efficiency Plant water needs Performance measures	Lecture, demonstration Guided discussion
20 minutes	<u>Fertilizers</u> Nutrients Impact on water quality Managing nutrients	Lecture
2 hours	<u>IPM</u> 15 m Define, benefits, problems Pests, pesticides IPM fields of action 15 m Abiotic plant disorders 60 m IPM in action Weeds Insects / biological control Vertebrates 15 m Permit BMP's 15 m Planning and budgeting IPM	Lecture Slides, guided discussion Slides, guided discussion Slides, guided discussion Guided discussion Lecture, slides
1 hour	<u>Exercises</u> 20 m IPM problem solving 20 m Fertilizer management 20 m Irrigation efficiency	Field exercise, guided discussion Field exercise, guided discussion Field exercise, guided discussion
5 minutes	<u>Post-knowledge survey</u>	

PHIL BOISE

41 HOLLISTER RANCH
GAVIOTA CA, 93117

Phone/Fax: 805.567.1420
pboise.ipm@earthlink.net

IPM and Irrigation Management Training Session, covering BMP 6-4.a

- ◆ Irrigation
- ◆ Soils
- ◆ Fertilizers
- ◆ IPM

1

Phil Boise Urban-Ag Ecology

☛ IPM

- IPM Consultant: School / Municipality
- Central California Regional IPM Coalition
- US EPA, CA Department of Pesticide Regulation
- CA School IPM Advisory Committee
- DPR School IPM Training
- Green Gardener Certification Program
- Green Childcare Program

☛ Farm manager

☛ Retail garden and farm supply

☛ County Department of Agriculture

☛ Licensed pest control advisor

2

Irrigation

3

IRRIGATION SCHEDULING:

MUST KNOW

- ☛ **How much water the system delivers**
"Application Rate" – catch can test
- ☛ **How evenly the water is delivered**
"Distribution Uniformity" – catch can test
- ☛ **How much water to replace**
"Evapotranspiration"
- ☛ **Unique site conditions**
Soil, sun, slope

4

Catch-Can Test for Lawns

- ☛ Application Rate
- ☛ Distribution Uniformity



How Much Water Do I Need To Replace? EVAPOTRANSPIRATION (ET)

☛ ET is:

- ☛ ET is a loss of water to the atmosphere by the combined processes of *evaporation* from soil and plant surfaces and *transpiration* from plants.

- ☛ Cottonwood trees will lose 100 gallons of water per hour during hot dry days



Scheduling Tools: UC IPM 'Guide To Healthy Lawns'

University of California Agriculture and Natural Resources
UC IPM Online
STATEWIDE INTEGRATED PEST MANAGEMENT PROGRAM

The UC Guide to Healthy Lawns



1. Northern California Coast
2. Northern Inland Valleys
3. Northern California Mountain Valleys
4. Sacramento Valley
5. San Joaquin Valley
6. Central Inland Valleys
7. Sierra
8. Central California Coast
9. Southern California Coast
10. Southern California Inland Valleys
11. Southern California Desert

[Back to start](#)

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Scheduling Tools: UC IPM 'Guide To Healthy Lawns'

Zone 8 - Central California Coast



What are you growing?

- Annual ryegrass
- Bermudagrass
- Buffalograss
- Colonial bentgrass
- Creeping bentgrass
- Dichondra
- Hard fescue
- Kentucky bluegrass
- Kikuyagrass
- Perennial ryegrass
- Red fescue
- Rough bluegrass
- Seashore paspalum
- St. Augustinegrass
- Tall fescue
- Zoysiagrass

Scheduling Tools: UC IPM 'Guide To Healthy Lawns'

Zone 8 - Cool-season grasses

[Back](#)



What is your sprinkler output?

- 0.5 inch / hour
- 1 inch / hour
- 1.5 inches / hour
- 2 inches / hour

**Determine your
sprinkler output**

[Home](#) | [Manage Pests](#) | [Resources](#) | [Research](#) | [Search](#)

Scheduling Tools: UC IPM 'Guide To Healthy Lawns'

The UC Guide to Healthy Lawns

Zone 8 - Cool-season grasses - 1 inch sprinkler output

[Back to start](#)

Irrigation recommendations	
Month	Amount of time to irrigate (minutes / week)
January*	25
February*	34
March	42
April	59
May	67
June	76
July	63
August	76
September	63
October	46
November	34
December*	25

- Divide the recommended number by the number of times a week you are watering.
- Cool season grasses require more frequent watering than warm season grasses because their root systems are not as extensive. Divide the required weekly minutes into about 3 equal irrigations, evenly spaced throughout the week. Fewer applications may be sufficient during cooler months. Desert areas, slopes or areas with shallow soils also need shorter, more frequent irrigations than warm season grasses.
- Be sure to monitor your sprinkler system to make sure you are getting uniform coverage. Repair and replace broken sprinklers as necessary.

EVAPOTRANSPIRATION (ET) CIMIS www.cimis.water.ca.gov

Monthly Average ETo Report

California Irrigation Management Information System
Department of Water Resources
Office of Water Use Efficiency
Rendered in ENGLISH units
Printed on January 11, 2006

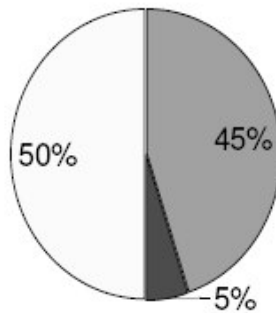
Number	Name	Region
3	Basin / Santa Cruz Co	Monterey Bay
4	Basin / Santa Cruz Co	Monterey Bay
16	Basin / Santa Cruz Co	Monterey Bay
104	Basin / Santa Cruz Co	Monterey Bay
111	Basin / Santa Cruz Co	Monterey Bay
112	Basin / Santa Cruz Co	Monterey Bay

Stn	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
3	3.02	3.23	3.66	4.14	5.23	5.87	5.84	5.47	4.23	3.44	2.38	3.33	46.37
4	3.02	3.23	3.66	4.14	5.23	5.87	5.84	5.47	4.23	3.44	2.38	3.33	46.37
16	3.02	3.23	3.66	4.14	5.23	5.87	5.84	5.47	4.23	3.44	2.38	3.33	46.37
104	3.02	3.23	3.66	4.14	5.23	5.87	5.84	5.47	4.23	3.44	2.38	3.33	46.37
111	3.02	3.23	3.66	4.14	5.23	5.87	5.84	5.47	4.23	3.44	2.38	3.33	46.37
112	3.02	3.23	3.66	4.14	5.23	5.87	5.84	5.47	4.23	3.44	2.38	3.33	46.37

Soils

Unique site condition

What is Soil Made of?



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Unique Site Conditions: Soil Texture

Soil Texture

- ◆ how it feels

Sand / Silt / Clay

- ◆ describe size of mineral particle

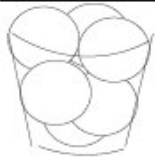
Loam

- ◆ 40% sand
- ◆ 40% silt
- ◆ 20% clay



Soil Particle Size

Sand: Basketballs
Watermelon



Silt: Softballs
Grapefruit



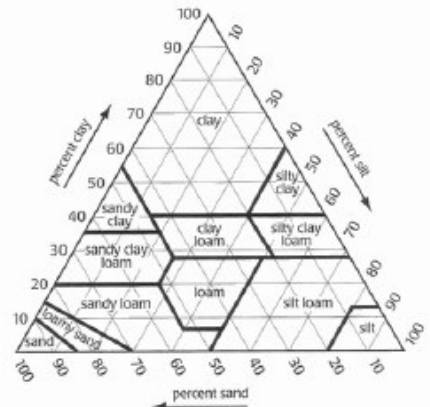
Clay: Golf balls
Eggs



- ◆ Which one holds more water?
- ◆ Which one has more air space?

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Textural Triangle



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Soil Horizons



- Organic matter
- 'A' horizon: topsoil, root activity
- 'B' horizon: subsoil transition zone
- 'C' horizon: Rock / fragments

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Managing Soil Life

◆ **1 teaspoon of HEALTHY SOIL**
(2 billion)
2,000,000,000
microorganisms

◆ **1 teaspoon of DEPLETED SOIL**
(5 hundred)
500
microorganisms

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Evaluating Soil Characteristics

What are the three things you do when you pick up a handful of soil?

- 1.
- 2.
- 3.

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EVALUATING SOIL CHARACTERISTICS

1. Smell It:

- ◆ An earthy, forest-y smell means high biological activity.
- ◆ A lack of smell, or only the smell of minerals (rust) indicates very limited biological activity.

2. Look at It: Color

- ◆ Dark brown soil high organic matter

3. Feel It: Texture

- ◆ Sand / Silt / Clay

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Performance Measures: Irrigation Runoff Control Procedures

- Irrigation systems require periodic inspection and testing to insure optimum performance.
- The ever-increasing importance of water conservation makes such inspections even more critical.
- Irrigation systems shall be evaluated on the number and percent of sprinklers operating according to planned patterns and time schedules.
- Performance will be measured by annual inspections which compare the number of operational sprinklers with that of the entire parks' system inventory.
- The goal is to maintain at least 90% of the sprinkler inventory in an operational condition, as determined using the performance measures listed below.

Performance Measures for Automatic Irrigation Systems

- The system irrigates when activated
- The system provides water to the entire area it is intended to service and does not over water nor create runoff of fertilizer.
- The system is adjusted to avoid watering hardscapes, tree trunks, or other unintended targets
- The system shuts down when de-activated

Performance Measures for Automatic Irrigation Systems

- The system is checked monthly for proper coverage, and any deficiencies are promptly repaired
- The sprinklers are free of interference from grass and debris
- The system's operational frequency is seasonally adjusted, and when rain is forecasted for more than one day, the system shall be turned off until irrigation is again needed
- The system was operated in conformance with local water conservation regulations

Performance Measures for Manual Irrigation Systems:

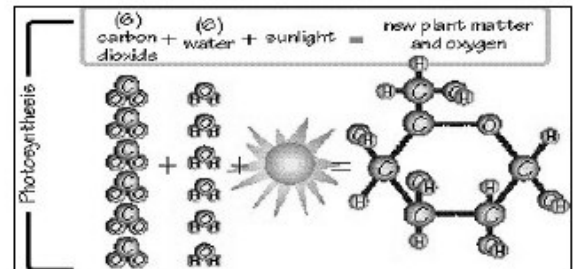
- The system will not be left operating while unattended for more than 30 minutes
- The system will not cause erosion from excessive flow
- The system will have shut off devices on all hoses
- The system was operated in conformance with local water conservation regulations

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Fertilizers

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Why Fertilize when you Photosynthesize? Plants Feed Themselves



☛ Sunlight plus 6 carbon dioxide and 6 water molecules makes 6 oxygen molecules plus stored energy

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Fertilize for Specific Purposes

☛ Fertilizers may be helpful to:

- ◆ Replace harvested / lost nutrients
- ◆ Aid plants not naturally adapted to some soils
- ◆ Push plants to meet specific functions

☛ In the landscape, what are we harvesting?

- ◆ Visual satisfaction – green leaves, colorful flowers
- ◆ Better function – turf, shade, hedge, habitat, food

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N-P-K

Nitrogen – Phosphorus - Potassium

Nitrogen (N)

Stimulates photosynthesis, used for vegetative growth

Sources

- ☐ Grass clippings and green leaves
- ☐ Organic sources
 - ☐ fish emulsion
 - ☐ blood, fish, cottonseed, soybean or alfalfa meals,
 - ☐ high nitrogen bird or bat guanos
- ☐ Synthetic fertilizers

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N-P-K

Nitrogen – Phosphorus - Potassium

Phosphorus (P)

Stimulates flower, fruit and root production. Rose fertilizers have higher levels of phosphorus.

Sources

- ☐ Synthetic fertilizers
- ☐ Organic sources
 - ☐ Rock phosphates, bone meal, high P bird and bat guanos.

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N-P-K

Nitrogen – Phosphorus - Potassium

Potassium (K)

Stimulates plant vigor, and disease and pest resistance

Sources

- ☐ Synthetic fertilizers
- ☐ Organic sources
 - ☐ horse manures
 - ☐ kelp
 - ☐ mineral
 - ☐ some soils

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BEST **Turft Supreme® 16-6-8**

DESIGNATED FOR USE ON TURF BY THE BEST TURF CARE MANUFACTURERS

DISCOUNT BUY THE TURF CARE DEAL

- It is formulated to work through phosphorus and potassium nutrients under a top coat of grass seed.
- It is formulated to protect and improve your grass seed and to protect your existing grass.
- It is formulated to protect and improve your grass seed and to protect your existing grass.
- It is formulated to protect and improve your grass seed and to protect your existing grass.

APPLICATION RATE:

1. Apply 10 lbs. per 1,000 sq. ft. of area to be treated.

2. Apply 10 lbs. per 1,000 sq. ft. of area to be treated.

3. Apply 10 lbs. per 1,000 sq. ft. of area to be treated.

4. Apply 10 lbs. per 1,000 sq. ft. of area to be treated.

PRODUCT INFORMATION:

1. Contains 16% Ammoniacal Nitrogen (N)

2. Contains 6% Soluble Phosphate (P₂O₅)

3. Contains 8% Soluble Potash (K₂O)

4. Contains 0% Sulfur (S)

5. Contains 0% Combined Sulfur

PREPARATION INSTRUCTIONS:

1. Mix thoroughly with water.

2. Apply to the area to be treated.

3. Water thoroughly after application.

4. Repeat application as directed.

APPLICATION PRECAUTIONS:

1. Do not apply to frozen or snow-covered areas.

2. Do not apply to areas where there is standing water.

3. Do not apply to areas where there is standing water.

4. Do not apply to areas where there is standing water.

5. Do not apply to areas where there is standing water.

Example of Synthetic Fertilizer

GUARANTEED ANALYSIS:

TOTAL NITROGEN (N)	16.0%
16.0% Ammoniacal Nitrogen	
SOLUBLE PHOSPHATE (P ₂ O ₅)	6.0%
SOLUBLE POTASH (K ₂ O)	8.0%
Sulfur (S)	0.0%
16.0% Combined Sulfur	
Iron (Fe)	1.5%

Derived from Monoammonium Phosphate, Ammonium Sulfate, Muriate of Potash, and Iron Oxy-sulfate.

Example of Organic Fertilizer

WE GUARANTEE

Whitney Farms guarantees your satisfaction with this product or your purchase price will be refunded. Mail your request, along with proof of purchase, (either a receipt or the UPC, bar code) to Whitney Farms, P.O. Box 70, Independence, OR 97351.

GUARANTEED ANALYSIS:

Total Nitrogen (N)	7.0%
6.5% Water Insoluble Organic Nitrogen*	
0.5% Water Soluble Organic Nitrogen	
Available Phosphorus (P ₂ O ₅)	3.0%
Soluble Potash (K ₂ O)	5.0%
Calcium (Ca)	5.0%
Sulfur (S)	1.0%
Iron (Fe)	0.5%

*Derived from: dried poultry manure, feather meal, bone meal, sulfate of potash, and ferrous sulfate.

*6.5% water insoluble organic nitrogen derived from feather meal, bone meal, blood meal and dried poultry wastes. Information regarding the contents and benefits of metals in this product is available on the Internet at: <http://www.usa.geology.gov> or <http://www.doe.state.or.us/soil/fertinfo>

Just a Reminder... Wash hands with soap and water after using this product. Products containing animal manures or byproducts may be attractive to dogs or other pets. If animals eat large quantities of these garden products, they may become sick. Do not apply this product along with pesticides.

P.O. Box 70
Independence, OR 97351
www.whitneyfarms.com

N - P - K



FALL
Lawn Food
with IRON

UNIVERSITY OF CALIFORNIA
EXTENSION
EARTH FRIENDLY
FALL
N 7 P 3 K 5

BEST Turf Supreme® 16-6-8

33

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*1.5% water insoluble organic nitrogen derived from feather meal, bone meal, blood meal and dried poultry waste.

Information regarding the contents and levels of nutrients in this product is available on the Internet at <http://www.whitneyfarms.com/green/green/> or <http://www.oda.state.or.us/fertilizers.htm>

Nutrient Solubility

GUARANTEED ANALYSIS:

TOTAL NITROGEN (N)	16.0%
16.0% Ammoniacal Nitrogen	
AVAILABLE PHOSPHATE (P ₂ O ₅)	8.0%
SOLUBLE POTASH (K ₂ O)	8.0%
Sulfur (S)	10.0%
16.0% Combined Sulfur	
Iron (Fe)	1.5%

Derived from Monoammonium Phosphate, Ammonium Sulfate, Muriate of Potash, and Iron Cysteate

Soluble (fast acting) and insoluble (slow release) nutrients.

Selecting And Applying Fertilizers For Motor Quality Protection									
LAWN FERTILIZERS						TUSP: per 1,000 sq. feet			
Product Name	Grass	% Nitrogen	Fertilizer Analysis	Rate	MAE. Pounds	Approx. / year	1,000 sq. ft.	per year	
Robinson's Lawn Seed With Iron	40%	12	12	1	3	12	3	12	
Melroe-Gro Lawn Feed with (20% seed)	18.0%	32	5	3	3	3	3	3	
Organic Lawn Fertilizer	20%	4	2	4	1	4	1	4	
Robinson's Lawn Fertilizer	20%	8	2	4	3	12	3	12	
No-Ride Solidus Pellets	40%	21	3	3	4	4	4	4	
Super Turf	40%	25	1	5	4	3	3	3	
Grass-Tall Builder with Iron (slow release)	40%	27	2	4	8	2	2	2	
Super Turf	40%	25	1	5	4	3	3	3	
Turf Supreme	70.0%	11	6	4	8	2	2	2	
Grass-Tall Lawn Fertilizer	40.0%	18	5	3	12	3	3	3	
Grass-Tall	50.0%	15	3	3	12	3	3	3	
GENERAL PURPOSE FERTILIZERS						TUSP: per 1,000 sq. feet			
Product Name	Grass	% Nitrogen	Fertilizer Analysis	Rate	MAE. Pounds	Approx. / year	1,000 sq. ft.	per year	
Robinson's Lawn All Purpose	20%	5	5	2	2	25	8	25	
Organic	20%	12	1	2	1	12	3	12	
Organic Season Long All Purpose	20%	12	15	2	3	7	2	7	
Grass-Tall Super and Flower	30%	5	7	2	3	16	8	16	
Organic Super Food (slow)	40%	11	5	10	4	8	3	8	
Grass-Tall Supreme	70%	11	10	12	8	3	3	3	
Grass-Tall Super Food	40%	20	11	12	8	3	3	3	
Libby Mite All Purpose Phosfor	80%	12	10	10	8	8	3	8	
Melroe-Gro All Purpose	70.0%	11	10	10	8	3	3	3	
Libby Mite Lawn & Garden	70.0%	11	10	10	8	3	3	3	
Maximum Loaded Supreme	80%	1	1	6	4				
Maximum Supreme Food	80%	1	1	1	1	1			
Grass-Tall Super Food	80%	1	1	1	1	1			

Use on lawns and all broadleafed ornamentals, shrubs, trees, etc.

36

Grass Cycling Facts

- ☛ Nitrogen from clipping can be recycled in 2 to 3 days (radio isotope studies)
- ☛ Average lawn = 300-400 lbs of clipping per 1,000 square feet per year
- ☛ 30 lbs of fertilizer with 8-4-6 analysis

Advantages of Grass Cycling

- ☛ NO cost to buy: Save 35-75% of fertilizer costs
- ☛ SAVE time: 50% less time
- ☛ BETTER soil: Adds organic matter addition to soil
- ☛ SAVE your back: 300 – 400 lbs clippings per lawn

37

Grass Cycling

Leave Clippings:

- ☛ More fertile soil
- ☛ More stable soil life
- ☛ Less compaction
- ☛ Healthier roots
- ☛ Better pest resistant

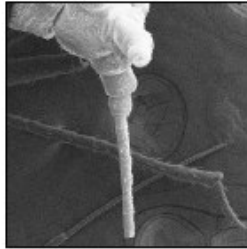
Haul clippings:

- ☛ Must add fertilizer
- ☛ Starve micro-organisms
- ☛ Worse compaction
- ☛ Stressed roots
- ☛ More pest prone

38

The Link Between Fertilizers and Pests

- ☛ Growth Outpaces Defenses
- ☛ Thin Cell Walls
- ☛ Cell Leakage
- ☛ Antagonisms / Deficiencies



39

Weeds as Indicators of Soil Conditions

- ☛ Soil conditions make clover more competitive, turf weak

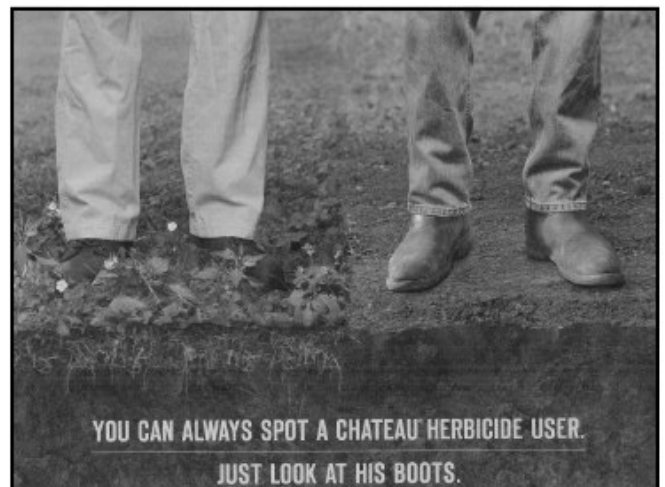
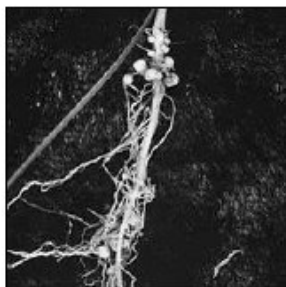
- ☛ Low N, compaction, low soluble Ca, drought



Weeds as Indicators of Soil Conditions

- ☛ Why is Clover indicator of low N?

- ☛ *Rhizobia* bacteria convert atmospheric Nitrogen in to fertilizer (NH_4)
- ☛ Makes clover excellent pioneer of low-fertility soil with little competition
- ☛ If clover dominant, means fertility is so low other plants can not compete



YOU CAN ALWAYS SPOT A CHATEAU HERBICIDE USER.
JUST LOOK AT HIS BOOTS.

Fertilizer Performance Measures

Fertilizers

- ◆ Minimize use of chemical fertilizers.
- ◆ Calibrate the distributor to avoid excessive application.

Erosion / Vegetation Management Performance Measures

Erosion Control

- ◆ Maintain vegetative cover on medians and embankments to prevent soil erosion.
- ◆ Apply mulch or leave clippings in place to serve as additional cover.
- ◆ Avoid disking as a means of vegetative management.
- ◆ Provide energy dissipaters (e.g. riprap) below culvert outfalls to minimize possible erosion

Vegetation Management

- ◆ Remove clipped or pruned vegetation from gutter, paved shoulder, and storm drain inlet areas.
- ◆ Avoid loosening soil when weeding manually or mechanically.
- ◆ When bailing muddy water, do not pour in storm drain, place over landscaped areas.

IPM

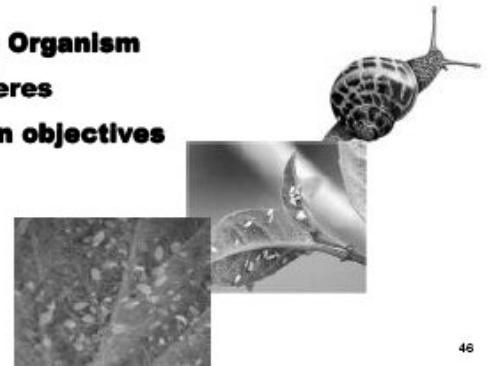
45

What is a Pest?

Living Organism

Interferes

Human objectives



46

What is a Pesticide?

Any material that attracts, repels or kills any pest

- ◆ Insecticide:
- ◆ Herbicide:
- ◆ Fungicide:
- ◆ Rodenticide:
- ◆ Miticide:
- ◆ Molluskicide:
- ◆ Disinfectant:



ALL pesticides are designed to kill

Only chemicals are pesticides

It is against the law for a pesticide to say it is 'Safe'

47

What is IPM? *Integrated Pest Management*

- ◆ Solves pest problems with the least risk to humans and the environment.
- ◆ Uses information about the pest and landscape to prevent and solve problems
- ◆ Prevents pest problems by changing the landscape so the pest cannot survive
- ◆ Is more than just low-hazard pesticides
- ◆ Uses many approaches

48

IPM

☛ **Good horticultural practices help to make the landscape healthier and more resistant to pest problems**

☛ **The best pest management program is a healthy plant:**

- ☛ Plants under stress are more susceptible to pest problems.
- ☛ Consider when you are over-stressed and under-rested. Are you more likely to get sick?



The Best Pest Management is a Healthy Plant

- ☛ **Soil Management**
- ☛ **Fertilizing**
- ☛ **Right Plant, Right Place**
- ☛ **Pruning**
- ☛ **Composting and Mulching**
- ☛ **Irrigation**



50

Five Fields of IPM Action

- ☛ **Education**
- ☛ **Management Practices ('Cultural' Controls)**
- ☛ **Physical Controls**
- ☛ **Biological Controls**
- ☛ **Reduced-Risk Chemical Control**



51

5 Fields of IPM: Education

- ☛ **Signs in Shoreline Park, Santa Barbara CA**



52

5 Fields of IPM: Management (Cultural)

- ☛ **Sanitation**
- ☛ **Irrigation**
- ☛ **Mowing**
- ☛ **Soil Care**
- ☛ **Pruning**
- ☛ **Fertilizing**
- ☛ **Plant Selection/Plant Replacement**




53





**5 Fields of IPM:
Physical**

- ☛ **Traps**
- ☛ **Lures**
- ☛ **Barriers**
- ☛ **Physical Removal**





56

**5 Fields of IPM:
Biological**

- ☛ **Use of one living organism to control another**

- ☛ **Benefits**
 - ◆ Effective
 - ◆ Cheap
 - ◆ Easy
 - ◆ Clients like it

58

**5 Fields of IPM:
Biological**

- ☛ **Beneficial Insects Are Already In The Garden**
 - ◆ Attract Beneficial Insects with flowers
 - ◆ Low pest populations are helpful
 - ◆ High value, low work
- ☛ **Buying and Releasing Beneficial Insects**

59

**5 Fields of IPM:
Reduced-Risk Chemical**




Santa Barbara Regional IPM Coalition
EPA Registration Exempt Herbicide Trials

59

**5 Fields of IPM:
Chemical**

- ☛ **What are considerations when selecting a pesticide?**
 - ◆ Impact on human health
 - ◆ 'Soft' on beneficials
 - ◆ Won't pollute the environment (rapid breakdown, low mobility, low eco-toxicity)
 - ◆ 'Target Specific'



60

Questions to Ask with Every Pest Problem:

How can I

- ◆ Modify the habitat?
- ◆ Change management practices?
- ◆ Physically remove or exclude the pest?
- ◆ Encourage biological controls?
- ◆ Use chemicals legally, safely, and with the least harm?

61

Why IPM? Concerns About Pesticides

- ◆ **ALL pesticides are designed to kill**
- ◆ **Only chemicals are pesticides**
 - ◆ Traps, barriers, biological control are not pesticides
- ◆ **It is against the law for a pesticide to say it is "safe"**
- ◆ **Estimated 1/2 of all pesticide use is in urban areas (landscapes, homes) = your job**

62

Why IPM? Children's Behavior, Development

- ◆ **Children are the most sensitive to toxic contamination.**
- ◆ **90% of a child's brain development occurs in the first four years of life.**
- ◆ **Children are built to absorb contaminants**
 - ◆ Highest skin-to-lung ratio, skin-to-body weight ratio, and hand-to-mouth contact of any age bracket.
 - ◆ Breathing rate is twice that of adults
 - ◆ Breathing zone is much closer to the ground where contaminants and irritants are likely to settle

63

Why IPM? Children's Health

What do we know about children's health?

- ◆ **The incidence of chronic childhood diseases including asthma, bronchitis, and cancers—such as leukemia—is increasing**
- ◆ **One child in six now suffers from a learning, developmental or behavioral disorder**

Some links to pesticides are clear, some are suspected but not proven

64

Why IPM? Children and Pesticides

- ◆ **90% of American children show traces of pesticides in their urine (1994)**
- ◆ **Penetration of some common pesticides through the skin is 50% higher in the young**
- ◆ **The toxicity may double synergistically when Vitamin C is added to the diet.**
- ◆ **Exposure to herbicides (weed killers) before the age of one is linked to a 459% increase in childhood asthma.**

65

Why IPM? Children and Pesticides

Studies show that children exposed to pesticides demonstrate

- ◆ an inhibited ability to learn
- ◆ decreased stamina
- ◆ problems with gross and fine eye-hand coordination and 30-minute memory
- ◆ reduced thyroid hormone levels

66

Monitoring and Thresholds

Monitoring:

- Observing a system for changes over time

Threshold:

- The point at which pest damage becomes greater than the effort and cost of control

67

Monitoring and Thresholds

Monitoring: Observing a system for changes over time

Qualitative:

- Shifts in quality (i.e. turf quality is improving)

Quantitative:

- Numerical counts to compare over time (i.e. line/grid transects; percent weed cover, number of gopher holes)

68

Monitoring and Thresholds

Threshold: The point at which the damage from a pest becomes greater than the effort and cost of control

Urban IPM Thresholds based upon:

- Safety (yellow jackets, black widow spiders)
- Loss of Assets (No immediate safety hazard, but buildings or landscape features may be lost to pest damage)
- Increased labor / nuisance (Pest may be more difficult to control without hazardous pesticides, or pest is a nuisance to site occupants)
- Aesthetic (pest or damage is unsightly)

69

Abiotic Plant Disorders

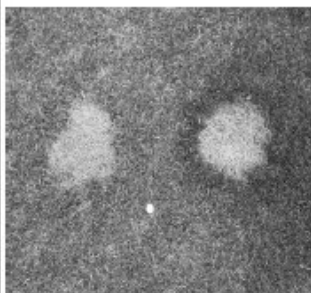
- "Abiotic" disorders are plant problems caused by non-living influences
- The majority of problems seen in lawns are the result of abiotic factors
- Abiotic disorders are often confused with pest damage. **DO NOT APPLY PESTICIDES WITHOUT POSITIVE PEST IDENTIFICATION**

70

Abiotic Plant Disorders

?

?

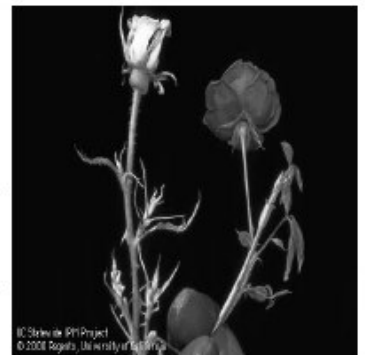


UC Statewide IPM Project
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Abiotic Plant Disorders

Symptoms:

- Foliage or shoots turn yellowish, undersized, or distorted.
- Leaves may appear "burned" with dead margins and drop.
- Overall pattern may be visible.



UC Statewide IPM Project
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Abiotic Plant Disorders

Symptoms:

- ◆ Stripes of green, white, or brown turf. Foliage may appear "burned" and die.
- ◆ Excess growth of succulent foliage.
- ◆ Plant is infested with many mites, aphids, psyllids, or other insects that suck plant juices.
- ◆ Overall pattern may be visible.



Abiotic Plant Disorders

Symptoms:

- ◆ Symptoms show first in older leaves.
- ◆ Even yellowing over whole leaf.
- ◆ New growth becomes weak and spindly.



Abiotic Plant Disorders

Symptoms:

- ◆ Older leaves turn yellow first
- ◆ Large areas of the lawn appear more-or-less uniformly yellow
- ◆ High concentration of clover



75

Abiotic Plant Disorders

Symptoms:

- ◆ Tissue pale yellow or white
- ◆ Veins remain green.
- ◆ the lawn appears 'mottled'
- ◆ most common on soils with pH of greater than 7.2



76

Abiotic Plant Disorders

Symptoms:

- ◆ Areas with high traffic or high clay content.
- ◆ Thin spots or completely bare areas may develop.
- ◆ broadleaf weeds or annual grasses often invade.
- ◆ Difficult to penetrate with a soil probe or screwdriver.

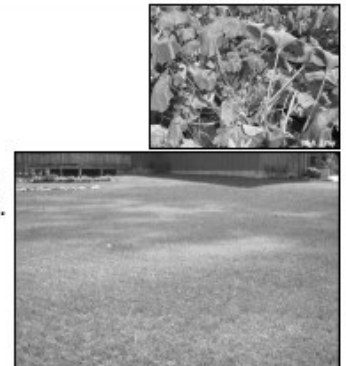


77

Abiotic Plant Disorders

Symptoms:

- ◆ Foliage yellows and drops.
- ◆ Twigs and limbs may die back. Bark cracks and develops cankers.
- ◆ Footprints remain depressed in lawn
- ◆ Plant may become attacked by wood-boring insects



Abiotic Plant Disorders

☛ Symptoms:

- ◆ Same as drought stress, root rot, crown rot
- ◆ Lower and inner foliage yellows and drops.
- ◆ Root crown diseases develop.
- ◆ Mineral toxicity symptoms develop.



79

Abiotic Plant Disorders

☛ Symptoms:

- ◆ Leaves turn yellowish or brownish, especially along margins.
- ◆ Foliage may drop prematurely.
- ◆ Bark becomes corky.



80

Abiotic Plant Disorders

☛ Symptoms:

- ◆ Yellow, brown, then white areas develop on upper side of leaves, beginning between veins.
- ◆ Foliage may die.



Abiotic Plant Disorders

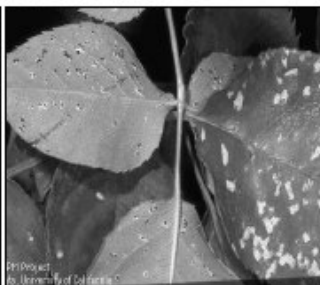
☛ BIOTIC OR ABIOTIC?



82

Abiotic Plant Disorders

☛ BIOTIC OR ABIOTIC?



83

Abiotic Plant Disorders

☛ BIOTIC OR ABIOTIC?



84

IPM for Weeds

85

IPM for Weeds: Information

Information:

- ◆ Life span: Annual, Perennial, Biennial
- ◆ Family line: Broadleaf, Grass/ Sedge/ Rush
- ◆ Reproduction strategy: Energy up (seed), Energy down (stolon, bulb etc)
- ◆ Adaptations: Fire, grazing, poor soil, disturbance, shade, etc.

86

IPM for Weeds: Management

Management: Annual Grass

- ◆ Mostly above-ground seeds
- ◆ Requires light and soil for germination
- ◆ Mulch and mowing effective

Management: Perennial Grass

- ◆ Often spread by stolon / rhizome
- ◆ No germination required
- ◆ Mow strip effective to prevent spread, mulch not effective if grass already established

87

Flame Weeding

Flaming effective on hardscapes, asphalt, backstops



Hot Water / Steam

◆ **Nozzle temp at 175F, 'melts' weeds – no fire danger.**

◆ **Trials show equal efficacy to herbicide after 83 days**



88

MULCH



Deep mulch

Shallow mulch:
moisture, not weeds

89

Weed Mat



Roll out, staple every 8 inches



Overlap 8 – 10 inches



Mulch 2 – 4 inches



Trim edges

UC Santa Barbara
Grounds and
Maintenance

91

Weed Mat

• In place
several
years

• Few
weeds,
loosely
rooted

• 3 hours to
hand
weed
10,000 sq.
ft.



UC Santa Barbara
Grounds and
Maintenance

- 5,000 sq. ft
- \$1,200 mat, staples, mulch
- 40 hours to install
- Save 125 hours over hand weeding in first year
- Mat lasts 10+ years
- Add limited mulch every 1 – 2 years

92

Mowing

• **Effective for annuals and seasonal perennials**



93

Turf / Landscape without mow strip



Turf / landscape with mow strip



94

IPM for Insects

95

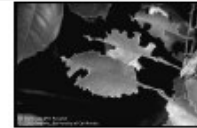
IPM

- Understanding the damage can help identify the pest
- Most pests have some kind of biological controls
- Low levels of most pests are tolerable

97

Diagnose Pest by Damage: Mouthparts

Chewing



Sucking



Rasping



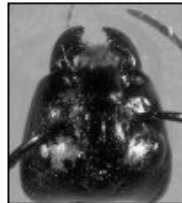
98

Diagnose Pest by Damage: Mouthparts - Chewing

- Chewing: Holes in leaves and on leaf margins**



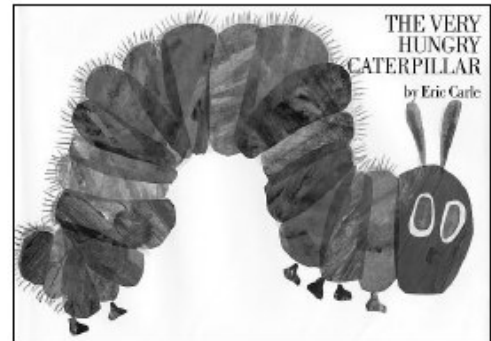
Ant



Beetle

99

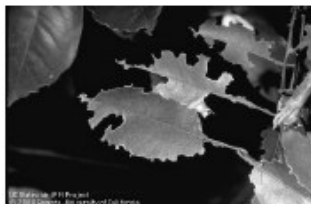
Diagnose Pest by Damage: Mouthparts - Chewing



100

Diagnose Pest by Damage: Mouthparts - Chewing

- Chewing: Holes in leaves and on leaf margins**



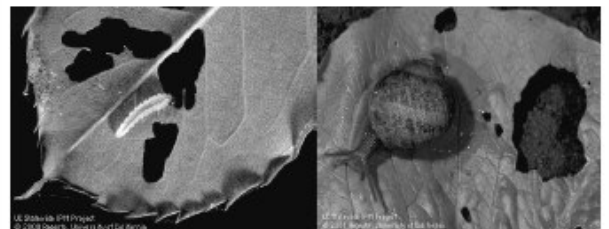
Fuller rose beetle



CA oakworm

101

Diagnose Pest by Damage: Mouthparts - Chewing



Rose slug = fly larvae

Non-insect: gastro-pod

102

Diagnose Pest by Damage: Mouthparts - Chewing

☛ Chewing

- ◆ Beetle – (*Coleoptera*)
- ◆ Fly – larvae (*Diptera*)
- ◆ Moth / butterfly – larvae (*Lepidoptera*)
- ◆ Bees, sawflies, ants – (*Hymenoptera*)
- ◆ Grasshoppers, crickets – (*Orthoptera*)
- ◆ Non-insect: slugs / snails (*Gastropoda*)

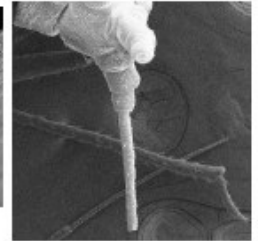
103

Diagnose Pest by Damage: Mouthparts – Piercing / Sucking

☛ Piercing: Weakened, curling, distorted leaves



Stylette piercing leaf tissue



104

Diagnose Pest by Damage: Mouthparts – Piercing / Sucking

☛ Piercing: Weakened, curling, distorted leaves



Aphid damage

105

Diagnose Pest by Damage: Mouthparts – Piercing / Sucking

☛ Piercing / Sucking

- ◆ Aphid, scale, whitefly, leafhoppers – adults and nymphs (*Homoptera*)



Aphid



Scale



Giant Whitefly



Leafhopper

- ◆ Bugs – adults and nymphs (*Hemiptera*)



Green stink bug



Cinch bug (turf)



Consperse stink bug

106

Diagnose Pest by Damage: Mouthparts – Rasping

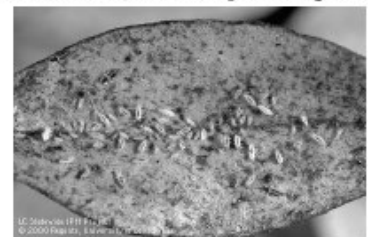
☛ Rasping: Silvered/ stippled, scraped leaf cells, generally underside



107

Diagnose Pest by Damage: Mouthparts – Rasping

☛ Rasp cell surface, suck plant juice



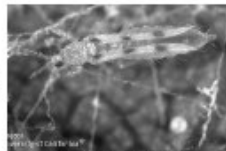
Thrips

108

Diagnose Pest by Damage: Mouthparts – Rasping

☛ Rasping

◆ Thrips (*Thysanoptera*)



Six spotted thrips

◆ Mites (*Arachnids – spiders, not insects*)



Strawberry spider mite

109

Biological Control

☛ Parasite: lay eggs in pest, or in/ on pest eggs



Aphid parasite inserting eggs into aphid



Tachnid fly eggs laid on top of caterpillar



Tricogramma wasp inserting eggs into caterpillar egg

110

Biological Control

☛ Predator: Consume pest



Lacewing larvae



convergent ladybug larvae

111

Biological Control

☛ Predator: Consume pest



Barn owl delivering gopher to nest in cliff



Barn owl nest box

112

Biological Control

☛ Benefits

- ◆ Effective
- ◆ Cheap
- ◆ Easy
- ◆ Clients like it



Biological Control

☛ Augmented: Purchased and released



Purchase eggs, larvae (aphid lions) feed on aphids, adults feed on pollen / nectar

114

Biological Control

Many sources, including:

- ☛ **Local retail nurseries / garden centers**
- ☛ **Rincon Vitova Insectary**
 - ◆ Rinconvitova.com
- ☛ **Peaceful Valley Farm Supply**
 - ◆ Groworganic.com
- ☛ **Harmony Farm Supply**
 - ◆ Harmonyfarm.com

115

Biological Control

☛ **Enhanced: Attracting existing beneficials to garden**



Adult syrphid fly feeds on pollen, nectar



Syrphid fly larvae feeds on aphids

116

Biological Control

Enhanced

☛ **Beneficial flies, stingless wasps, native lacewing:**

- ◆ Adults feed on pollen and nectar first
- ◆ Seek pest populations to lay eggs in, on, or near
- ◆ Best flowers: upright presentation, multiple florettes



Pest & beneficial insect associations

Beneficial Insect	Major Pest
Hoverflies	Aphids, Mealybugs
Lady Beetles	Aphids, Leafhoppers, Scales, Mites, Mealybugs
Minute Pirate Bug	Corn Earworm, Whitefly, Leafhoppers, Mites
Lacewings	Leafhoppers, Mites, Aphids, Thrips, Mealybugs, Whitefly
Parasitic & Predatory Wasps	Caterpillars, Aphids, Mealybugs, Leafhoppers
Tachinid Flies	Caterpillars, Squash Bugs, Stink Bugs
Bigeyed Bug	Mites, Lygus, Whitefly, Caterpillars

Native species that attract beneficial insects

Santa Barbara Botanic Garden



Elderberry: *Sambucus mexicana*
hoverflies and wasps

Native species that attract beneficial insects

Santa Barbara Botanic Garden



Coffeeberry *Rhamnus californica*
lady beetles, hoverflies, and wasps

Native species that attract beneficial insects

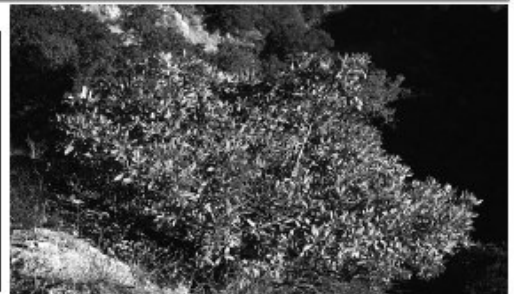
Santa Barbara Botanic
the GARDEN



Coyote Brush *Baccharis pilularis*
wasps, tachinid flies, hoverflies,
minute pirate bug

Native species that attract beneficial insects

Santa Barbara Botanic
the GARDEN



Toyon *Heteromeles arbutifolia*
tachinid flies, wasps, hoverflies

Native species that attract beneficial insects

Santa Barbara Botanic
the GARDEN



Red-flowered Buckwheat
Eriogonum grande rubescens
minute pirate bug, tachinid flies, hoverflies

Native species that attract beneficial insects

Santa Barbara Botanic
the GARDEN



Common Yarrow *Achillea millefolium*
hoverflies, wasps, lady beetles

124

Native species that attract beneficial insects

Santa Barbara Botanic
the GARDEN



Butterfly Weed *Asclepias fascicularis*
hoverflies, wasps, and lady beetles

125

Native species that attract beneficial insects

Santa Barbara Botanic
the GARDEN

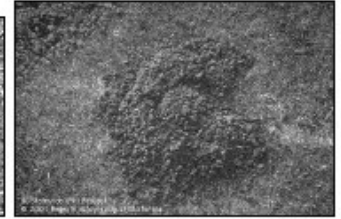


Ceanothus 'Gentian Plume'
wasps, lady beetles, lacewings, and hoverflies

Vertebrate IPM

127

Vertebrate IPM: Pocket Gopher



- ✓ Poor eyesight
- ✓ Developed sense of smell
- ✓ Crescent-shaped mound
- ✓ Plugged kick-out hole

128

Vertebrate IPM: Pocket Gopher

Biology

- ☛ Burrows and runs = 200 – 2,000 square feet
- ☛ Solitary except females with young: Often high damage from 1 gopher
- ☛ 1 generation per year non-irrigated, 3 generations per year irrigated
- ☛ Active year round, do not hibernate, active day and night
- ☛ Poor eyesight, developed smell
- ☛ Feed below ground: roots, vegetation pulled into burrows

129

Vertebrate IPM: Pocket Gopher

Activity

- ☛ Winter: Reduced activity, breeding
- ☛ Spring: Increasing activity: adults and juveniles
- ☛ Summer: High activity
- ☛ Fall: High activity, breeding, burrow building

130

Vertebrate IPM: Pocket Gopher Questions to Ask

- ☛ **Modify the habitat (food, water, shelter)?**
 - ☛ Gophers like clover
- ☛ **Change management practices?**
 - ☛ Mow high if possible, improve soil fertility to discourage clover
- ☛ **Physically remove or exclude the pest?**
 - ☛ Trapping
 - ☛ Vertical wire (1/2 inch holes) buried at least 24", above at least 8"
- ☛ **Encourage biological controls?**
 - ☛ Barn owl boxes
- ☛ **Use chemicals legally and with the least harm?**
 - ☛ No recommendations

131

Record keeping
(93 kills, 3 partial days)

Traps, probe, shovel, paint

Probe main run, dig out a clean plug, mark spot with paint 1-arm length away

The Francisco Method:
Ventura Unified

Set 2 traps, anchor with soil staple so nothing is above ground (bait with apple slice)

Replace soil plug, rub soil so trapping site disappears

Vertebrate IPM: Ground Squirrel



- ✓ Excellent eyesight
- ✓ Developed sense of smell



- ✓ Large, multiple holes
- ✓ Active burrows limited loose soil

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Vertebrate IPM: Ground Squirrel

Biology

- Burrows and dens multiple chambers, exits
- Colonial, familial: many in same burrows and dens
- 1 generation per year
- Often active year round (coastal), may 'estivate' (late summer) and 'hibernate' (winter)
- Excellent eyesight
- Winter/ spring: Feed on roots, turf, vegetation, scavenge trash
- Summer/ fall: Feed on roots, seeds, girdle trees, scavenge trash

134

Vertebrate IPM: Ground Squirrel

Activity

- Winter: Reduced activity, breeding
- Spring: Increasing activity: adults and juveniles
- Summer: High activity (August / September reduced activity in hot areas)
- Fall: High activity, breeding

135

Vertebrate IPM: Ground Squirrel Questions to Ask

- **Modify the habitat (food, water, shelter)?**
 - ◆ High groundcover may discourage
 - ◆ Visual barriers (shadecloth on fence) may discourage
 - ◆ Sanitation / trash management / discourage feeding by public
- **Change management practices?**
 - ◆ No recommendations
- **Physically remove or exclude the pest?**
 - ◆ Live trapping
- **Encourage biological controls?**
 - ◆ Raptors active during day may be of some benefit
- **Use chemicals legally and with the least harm?**
 - ◆ No recommendations

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Vertebrate IPM: Ground Squirrel Live Trapping

■ Physically remove or exclude the pest?

- ◆ Live trapping – Black Fox trap
- ◆ Humane dispatch – CO2



137

Pesticide Performance Measures

- **Pesticides (Diazinon, Chlorpyrifos, and similar products)**
 - ◆ Follow federal, state, and local laws governing the use, storage, and disposal of pesticides/herbicides.
 - ◆ Use pesticides only when there is a pest problem.
 - ◆ Avoid use of copper-based pesticides. Use the least toxic pesticide for the job.
 - ◆ Do not mix or prepare pesticides near storm drains.
 - ◆ Use the minimum amount needed.
 - ◆ Use up pesticides. Rinse containers, use rinse water as product, dispose of unused pesticides as hazardous waste.
- **Herbicides**
 - ◆ Replace existing vegetation with fire resistant and native vegetation to reduce need to herbicides.
 - ◆ Do not use if rain is expected.

**Reducing Pesticide Risk –
A Practical Approach**
The PHAER Zone System
(Pesticide Hazard And Exposure Reduction)



CPRS Conference, March 8, 2007

Santos Escobar:
City of Santa Barbara Parks Manager
Phil Boise: Urban – Ag Ecology

139

Integrated Pest Management

- ◆ The Definition of IPM is.....
- ◆ IPM defines the process of controlling pests
- ◆ 5 fields of IPM:
 - ◆ Education
 - ◆ Cultural (management)
 - ◆ Physical (barriers, traps)
 - ◆ Biological
 - ◆ Chemical
- ◆ Monitoring/ record keeping / pest biology / thresholds

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Integrated Pest Management

- ◆ IPM does not:
 - Set risk reduction goals and measure progress
 - Communicate pesticide hazard or stewardship to public
- ◆ **IPM** is **Process** based
- ◆ **PHAER** is **Results** based

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PHAER Zones



**PESTICIDE HAZARD
AND EXPOSURE
REDUCTION
(PHAER) ZONES
IN THE LANDSCAPE**

A guidebook for
schools, parks,
childcare providers,
landscape professionals
and environmental
managers.

Phil Boise
Urban / Ag Ecology
Consulting Services
Gaviota, CA

October 2004
v 1.2

Collaborators

- ◆ Cal. Dept. Pesticide Regulation
- ◆ US EPA / National Foundation for IPM Education
- ◆ City of Santa Barbara
- ◆ Santa Monica Parks
- ◆ Ventura City Parks
- ◆ County of Santa Barbara Parks
- ◆ Santa Maria Parks
- ◆ San Francisco Parks
- ◆ Ventura Unified School District
- ◆ Santa Barbara City College
- ◆ UC Santa Barbara Maintenance Department
- ◆ Californians for Pesticide Reform
- ◆ UC IPM program

PHAER Zone Goal

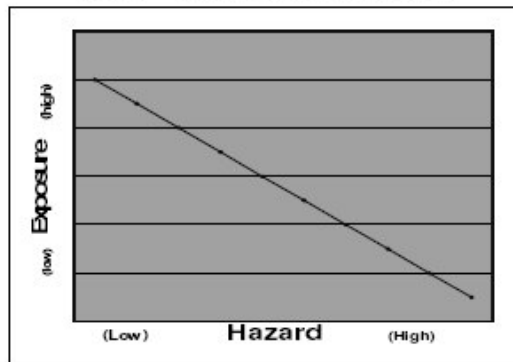
**ELIMINATE
EXPOSURE to
HAZARDOUS
PESTICIDES**

– Human and environmental exposure

144

What Is Risk?

$$\text{Risk} = \text{Exposure} \times \text{Hazard}$$



Pesticide

- ♦ "Any substance, or mixture of substances, used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest, which may be detrimental to vegetation, humans, or animals."

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Are All Pesticides Hazardous?

Newman's Own Family Recipe Italian Dressing



Vegetable Oil (Soybean Oil and/or Canola Oil), Water,
Vinegar, Romano Cheese (Pasteurized Milk, Cheese Cultures, Salt, Enzymes),
Salt, Contains 2% or Less of
Garlic Powder, Sugar, Spices, Barley Malt Extract, Anchovies,
Citric Acid, Hydrolyzed Soy Protein, Xanthan Gum, Paprika,
Molasses,
Corn Syrup, Caramel Color,
Onion Powder, Tamarind, Natural Flavor

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PHAER Zone System:

- ♦ **Results-Based** Risk Reduction Management Tool
 - Map Sites based on exposure
 - Carefully screen pesticides for hazard
 - Assign Zones: Green / Yellow / Red
 - Set Risk-reduction goals
 - Communicate to public

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'GREEN' Materials:

- **Cancer** (known, likely, probable, possible): **Prohibited**
- **Reproductive toxicants**: **Prohibited**
- **Endocrine disruptors**: **Prohibited**
- **Eco-toxicity**: **Prohibited**
- **Persistence (half-lives)**: **Lowest**
- **Water pollution potential**: "Extremely / Very Low"
 - **Lowest acute hazard**
- **Food/ household grade** (US EPA Registration Exempt)
 - 27 data points
 - Government data
 - San Francisco / Kings County, WA

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GREEN Zones

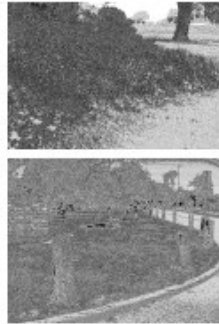
- Areas of greatest sensitivity
- Managed with Green Materials



150

YELLOW Zones (Transitional)

- If you can't do it all now...
- Transition speed based on resources, standards



151

Prioritize Limited Resources

from
YELLOW

to
GREEN

No Exposure to
Hazardous Pesticides



Implement – 4 Steps

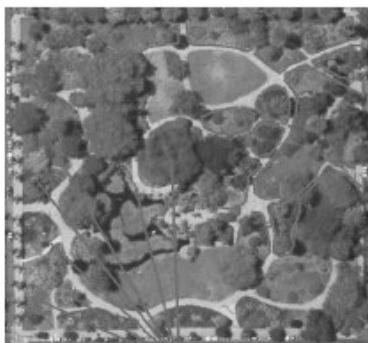
1. Map for exposure
 - Identify habitat modifications necessary for sustainable Green
 - ♦ Mow strips
 - ♦ Landscape bed renovations
2. Management overlay
 - Increase / decrease Green
3. Cost-out habitat modifications
 - Sustainable Green / Transitional
4. Establish transitional timeline based upon resources

Alice Keck Park Memorial Gardens



1. Map for exposure, identify hab mods
 - Step 1 designation:
Yellow = limited exposure

2. Management overlay: All Green



Planter Modification:

3. Cost of habitat modifications for sustainable Green management

- Mow strips: \$30 / linear foot
- Landscape bed: \$0.48 / square foot

PHAER Zone Data Sheet
Alphabetized

Site	Green Acreage	Yellow Acreage	Mow Strip Linear Feet	Mow Strip Cost (\$30 LFT)	Planter Area Modification	Planter Mod Cost (\$0.48 FT ²)	Fence Replacement LFT	Fence Cost (\$60 LFT)	Park Total Cost
ALICE KECK PARK MEMORIAL GARDENS	4.5	4.5	2000	\$60,000	16500	\$7,920	0	\$0	\$67,920

1. Map for exposure
2. Management overlay
3. Cost out habitat modifications

4. Establish 'Transition-To-Green' timeline based upon resources

FY 07	FY 08	FY 09	FY 10	FY 11	FY 12
Calvin Ball Park	Madrona Park (except Lawns - dependent upon new 'green' materials)	Dwight Murphy Ball Park	Orpet Park	Franceschi Park Upper	Franceschi Park Lower
Chase Palm Park parking lot	Leadbetter Parking Lot	San Roque Park	Ferthing Park	Las Posas Tennis Courts	
Spencer Adams (except Lawns - dependent upon new 'green' materials)	East Beach Parking Lots (2)	AC Foster Rose Garden/Mission Historic Park (dependent upon new 'green' materials)		Municipal Tennis Courts	
	Waterfront Harbor Area parking lots				

Benefits of PHAER Zone

- Highest Standard of Safety in Areas of Greatest Need
- Incremental/ Measurable /Accountable
- Common Between Jurisdictions
- Pesticide Use Communication Tool/ Signage for Public
- Public Education through Demonstration
- Clearly Demonstrates Good Stewardship

PHAER Zone Model for City of Santa Barbara



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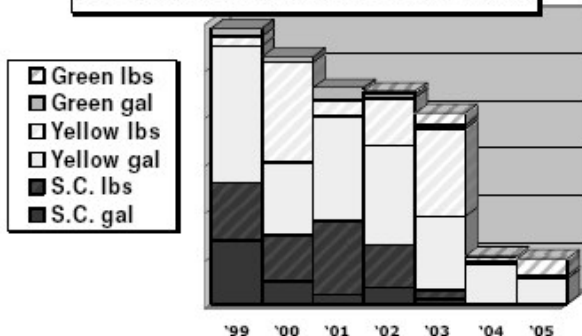
City of Santa Barbara IPM

- IPM Strategy approved 2004
- PHAER Zone approved 2006
- Community Advisory Committee

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City of Santa Barbara IPM

Parks Division Pesticide Use: 7 Years



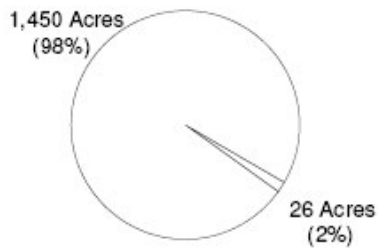
161

Parks and Recreation

- 49 Parks
- 4 Ball Fields
- Golf Course

162

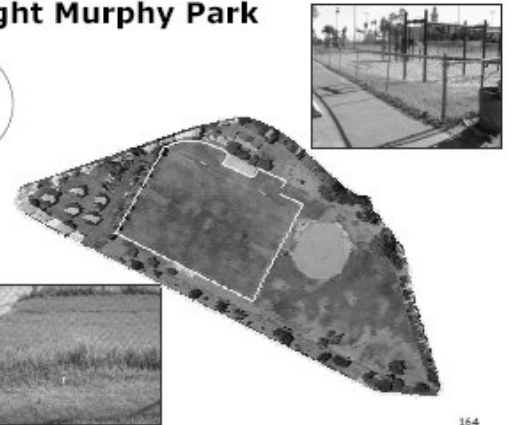
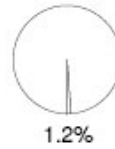
City Parks



1,476 Acres Parkland Total
(Includes 486 Acres Previously Designated as Pesticide Free)

163

Dwight Murphy Park



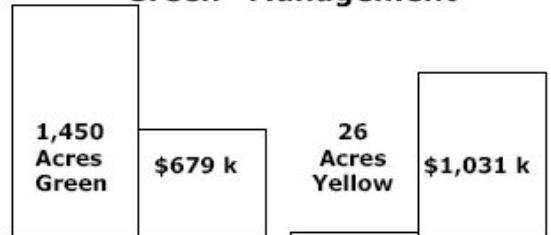
164

Mission Historical Park & A.C. Postel Rose Garden



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Transitional Costs to Sustainable "Green" Management



	Green	Yellow	Total
Acreage	1,450	26	1,476
Transitional Cost	\$679,000	\$1,031,000	\$1,710,000
Cost per Acre	\$470	\$28,640	

166

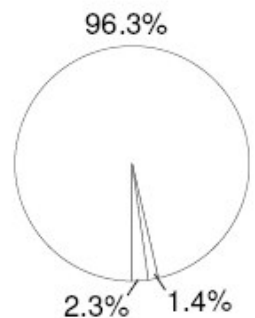
Modifications and Improvements

Resources for keeping areas Green, or transitioning Yellow areas to Green, are directed to the highest priority sites, using tools such as habitat modifications.

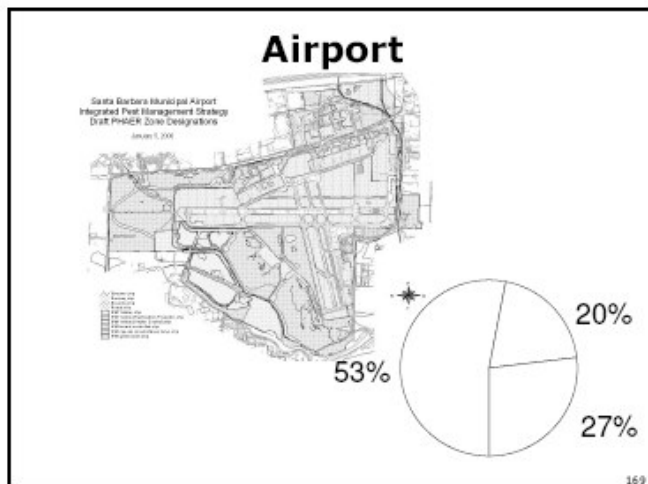


167

Golf Course



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Contacts

- ◆ **Santos Escobar**
City of Santa Barbara Parks Manager
SESCOBAR@SantaBarbaraCA.gov
805.564.5464
- ◆ **Phil Boise**
Urban-Ag Ecology
Pboise.ipm@earthlink.net
805.567.1420
- ◆ **www.home.earthlink.net/~phaerz**
PBOC

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Ground Squirrels

- **Protect slope stability, prevent contact**

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'GREEN' PESTICIDES

<u>Matran 2: (OMRI)</u>	
Clove oil	46%
Water, lecithin	54%
<u>Burn Out II:</u>	
Clove oil	12%
Sodium lauryl sulfate	8%
Vinegar, lecithin, water, citric acid, mineral oil:	80%
<u>Rode-trol</u>	
Corn oil concentrate	0.005%
Molasses	1.00%
Corn	98.995%
<u>Vectobac-G Biological Mosquito Larvicide</u>	
Bacillus thuringiensis (Bt)	
<u>Sluggo Snail Bait</u>	
Iron phosphate	1%
food grade inerts	99%
<u>Advance Liquid Ant Bait</u>	
Boric Acid	1%
Sugar and protein bait	99%

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**Powerpoint Presentation Slides Used for BMP 3-3.a Training of Personnel to
Perform Business Inspections**

Stormwater Business Inspections



Auto Repair
Gas Stations
and Restaurants



Monterey Regional Stormwater Management Plan

*Submitted to RWQCB in 2003
Adopted by the RWQCB in 2006*



The NPDES Stormwater Permit



The permit has six elements:

1. Public Education
2. Public Involvement
3. Illicit Discharge Detection /Elimination
4. Construction
5. New Development
6. Good Housekeeping

Member Agencies

City of Pacific Grove
City of Monterey
City of Seaside
City of Sand City
City of Del Rey Oaks
City of Marina
County of Monterey
Carmel By The Sea



Inspecting Vehicle Service Facilities

What Pollutants Are We talking About Here?



Gasoline



Oil



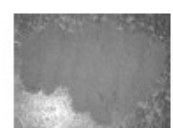
Antifreeze



Diesel



Brake Fluid



Brake Dust

Inspection Forms Provided

Compliance Inspection Checklist for Vehicle Service Facilities	
Facility Name	
Facility Address	
Facility Contact	
Inspection Date	
Inspector Name	
Inspector Title	
Facility Type	
Facility Size	
Facility Age	
Facility Location	
Facility Description	
Facility Owner	
Facility Manager	
Facility Employee	
Facility Customer	
Facility Staff	
Facility Equipment	
Facility Materials	
Facility Supplies	
Facility Tools	
Facility Parts	
Facility Repairs	
Facility Maintenance	
Facility Safety	
Facility Security	
Facility Environment	
Facility Community	
Facility History	
Facility Future	
Facility Notes	
Facility Signature	
Facility Date	

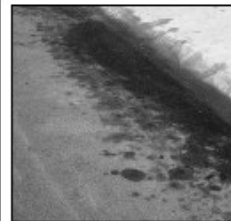
Start On The Outside



Only "Dry" Vehicles Outside?



Obvious Signs Of Trouble



Take A Look Behind The Shop



Hidden Treasures?



Evidence Of Cleaning Parts or Equipment Outside?



Batteries. A Common Outside Storage Issue



Just because they are being recycled does not make it right

Correct Waste Disposal Systems In Use?



Waste Storage Area Covered/Indoors?



Obvious Signs Of Leaks?



Inside The Shop



Is Management Receptive?



Is A Fully Stocked Spill Kit
Readily Available?



Floors Regularly Swept or
Mopped?



Shop Vac Available?



Dust/dirt disposed of in
compliance with local regs?

Rag
Service In
Use?



Drip Pans In Use?





Dust Generating
Activities
Properly
Managed?

Components Drained Prior To
Work?



Parts Cleaners Properly Used?



Steam Cleaning Using A Closed
Loop System?



Bulk fluids and wastes double
contained?



Leaks and Drips Managed
Properly?



Sometimes something
unexpected happens. Is
enough absorbent
material around to take
care of a large spill?

Car Washing



Bilge Socks = Cheap Drain Insurance



Restaurant Inspections



Start On The Outside



Check Nearby Storm Drains



Signs Of
Illegal
Disposal of
Grease/Food?

Garbage Enclosure and Containers



Indications of Trouble?



Tallow Container Placed Appropriately?



Food Waste Disposed Too Wet?



Plastic Leak-Proof Dumpsters Available



Regardless of construction material, are container lids always kept closed?

If A Drain Is Located Inside The Enclosure Is It Routed To A Sanitary Sewer?





Leaking
Compactor?

Signs of Mat Washing?



Waste
Cooking
Oil Just
Sitting
Around?



Grease Traps
Work Better
Under The
Sink



Is the Grease
Interceptor
Cleaned
Regularly?

Inside The Restaurant



Management Receptive?



How About The Trap Under The Sink?



How Do They
Deal With Mop
Water?



Absorbents
Around In Case
of A Spill?



Gas Stations



Management Receptive?



Does The Canopy Drain Properly?



Emergency/Overfill Prevention System In Place?



Signs About Topping Off Posted On Site?



Drips and Leaks Cleaned Routinely?



Automatic Shutoff Nozzles In Use?



High Use Areas Such As Air Water Supply Kept Clean?



Other Businesses



Follow the Basics:

- Look for piles of trash, liquids and stains on any surfaces.
- Are waste containers placed and maintained properly?
- Will materials from inside the building be transferred outside?

Remember.
The Public Is Watching



**Powerpoint Presentation Slides Used for BMPs 4-2.a and 4-3.a Training of Staff on
Construction Site Plan Review and Inspection Procedures**

Monterey Regional Stormwater Management Plan

*Submitted to RWQCB in 2003
Adopted by the RWQCB in 2006*

The NPDES Stormwater Permit



The permit has six elements:

1. Public Education
2. Public Involvement
3. Illicit Discharge Detection/Elimination
4. Construction
5. New Development
6. Good Housekeeping

Member Agencies

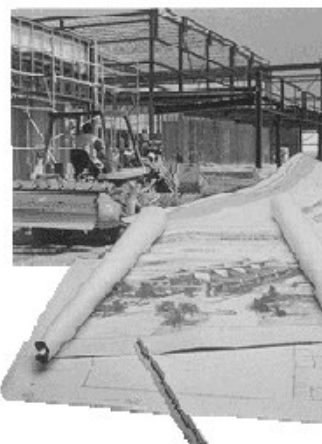


City of Pacific Grove
City of Monterey
City of Seaside
City of Sand City
City of Del Rey Oaks
City of Marina
County of Monterey
Carmel By The Sea

Annual Meeting of Inspectors From All Participating Entities



The Inspection



Begin With
Reviewing
The
StormWater
Pollution
Prevention
Plan (1 Acre +),
Grading Plan
or Erosion
Control Plan

Get To Know The Site Superintendent



Employees and
Subcontractors
Need To Be
Informed
About SWPPP

Make Sure Contractor/Subs Aware of All Drains, Swales and Creeks



Remember Everything Leads To The Sanctuary



99% Of The Problem Is Sediment



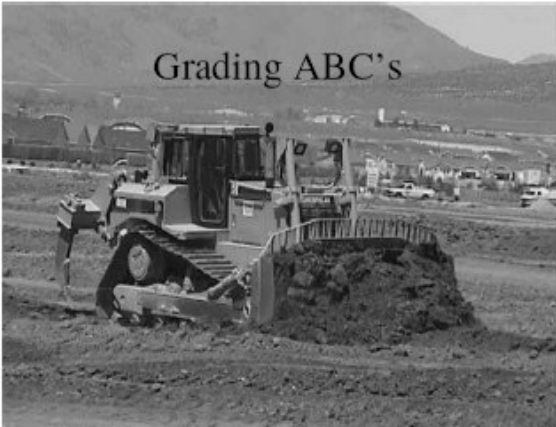
Check All Drainage Points For Signs Of Trouble



Construction Site Entrance Protection



Grading ABC's



Are They Really Planning To Do Grading During The Wet Season?



If Major Grading
Occurs Before Winter
And Then Work Stops
The Site Needs to Be
Fully Protected.



Preserve Natural Vegetation



Erosion Control Basics



Many Sites Need More Than Just
Sediment Capture BMP's





Not Acceptable



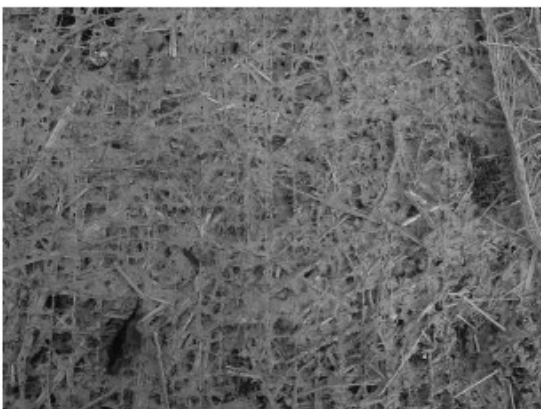
Stockpiles and Bare Slopes Must Be Protected



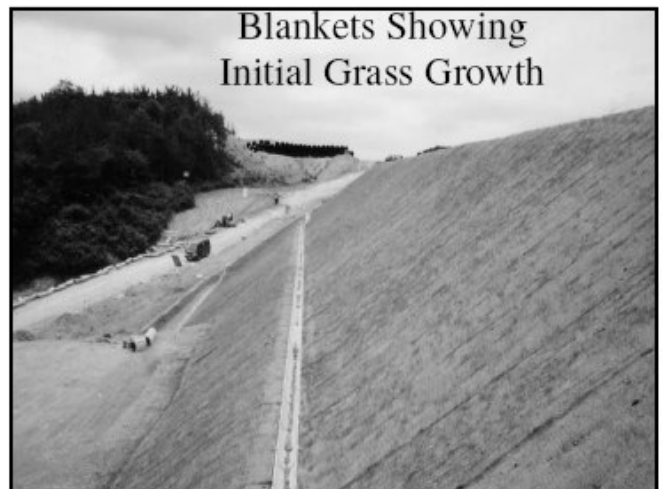
Perhaps The Best Technique
Erosion Control Blankets.



Blanket With Binder and Seed



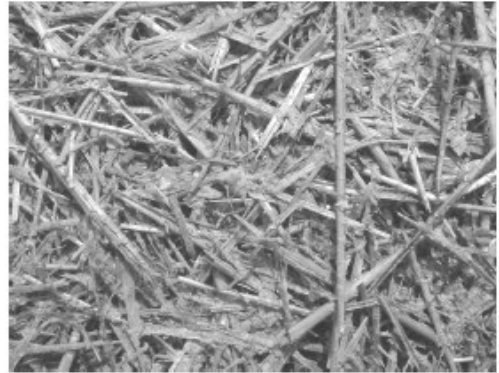
Blankets Showing
Initial Grass Growth



Hydroseeding



Install During September and Irrigate
Until Rains Begin



Wattles For Long Slopes

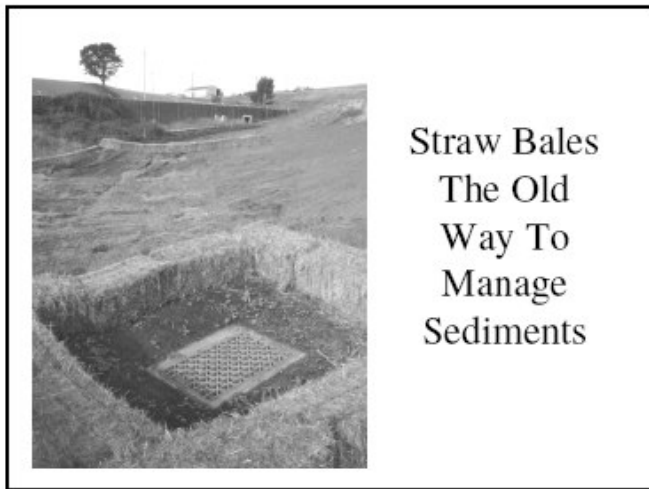
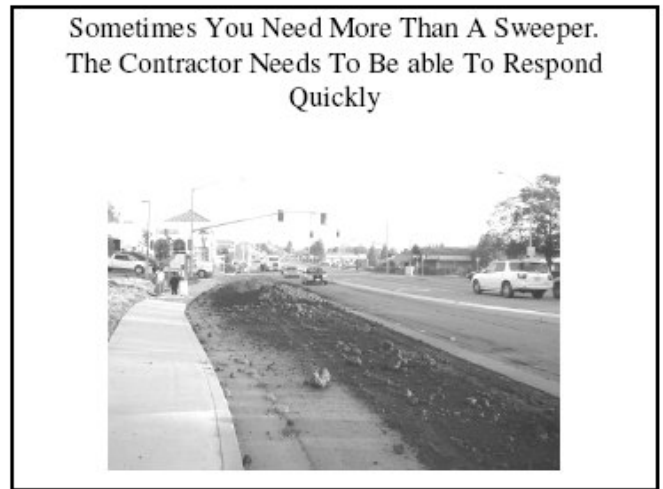


Plastic Can
Be Used
But.....



BMP's To Minimize Soil Movement





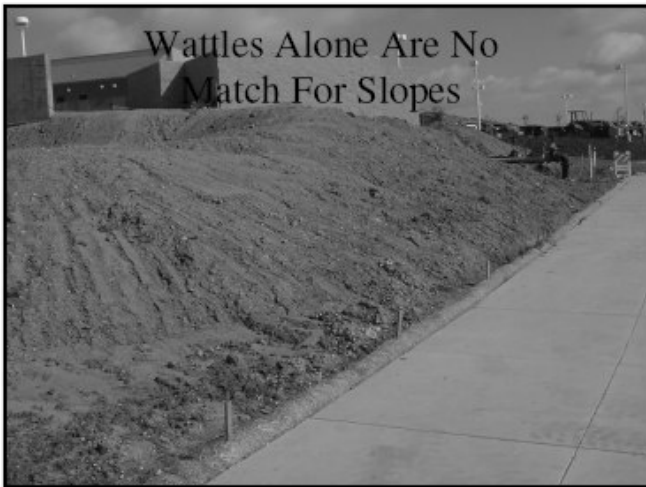
If It's Flat, Wrap it With Wattles



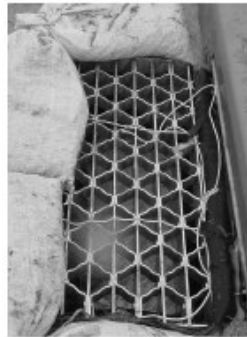
Watch Out For
Vehicle Access Points



Wattles Alone Are No
Match For Slopes



Drain Inlet Protection



Gravel/Sand Bags Need Constant
Attention



How Is Runoff Controlled and
Conveyed?



You Can Route it With Fabric And Wattles



Vegetated Swales



Trash Management

Dumpsters and cans are preferable. If infeasible, hauler must pick up materials daily and provide tarps to avoid getting wastes wet.



Sites With Paved Access Can Usually Use Debris Boxes



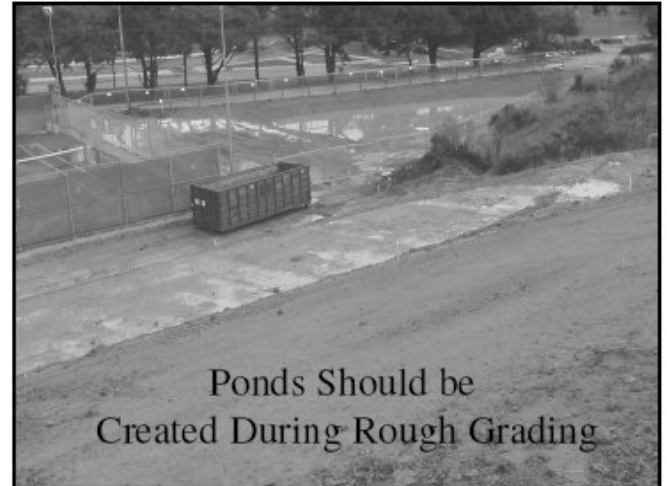
No Comment



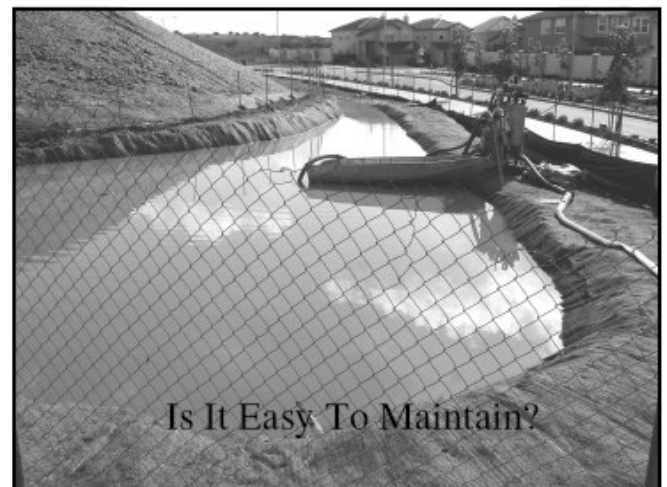
Equipment Properly Maintained?



Detention Ponds



Make Sure the Ponds
are Properly Designed
and Maintained



The Other 1%



Its not necessary to freak out
about chemical and other
wastes.

Make sure the contractor
knows that the storm drain is
not a disposal device and that
all chemicals need to be kept
out of the rain.



Cement Truck
Washout
Facility



Road Surfaces Only Applied
During Dry Weather?



Stucco Is Messy. Plastic Sheets and Daily
Cleanup Needed



Paint
Disposal

It
Happens



Correct PPE, but.....



The 2 Most Important Pieces Of
Inspection Equipment



**Powerpoint Presentation Slides Used for BMP 4-4.b Construction Contractor
Educational Presentations**

STORMWATER & EDUCATION ALLIANCE

sea

www.montereysea.org

County of Monterey Public Beach Company

United School Districts of Monterey

Monterey

Pacific Grove

City of Carmel-by-the-Sea
San Jose District
Monte
Piedra Blanca
San Jose City
Seaside

County of Monterey
Piedra Blanca Company
United School Districts
Carmel
Monte
Piedra Blanca



Impacts

"On a unit basis, construction sites export sediment at 20 to 1,000 times the rates of other land uses."



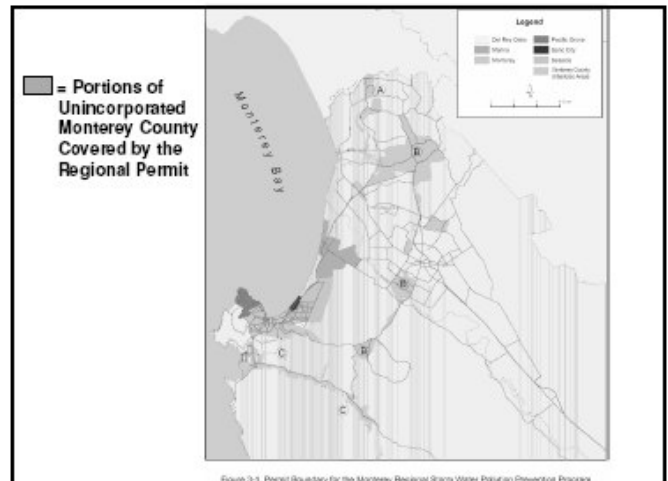
Impacts

One gallon of oil has the potential to contaminate up to one million gallons of water



Monterey Regional Storm Water Management Program (MRSWMP)

- MRSWMP establishes the core requirements of the Regional permit (issued in September 2006)
- Permit issued to the cities of:
 - Pacific Grove • Monterey • Seaside
 - Sand City • Del Rey Oaks • Marina
 - Carmel-by-the-Sea
 And certain of the unincorporated portions of Monterey County
- Contains BMPs for each Minimum Control Measure



MRSWMP BMPs for Construction Site Storm Water Runoff Control

- Each entity to adopt an ordinance with standards for storm water pollution prevention from construction activities
- Implement procedures for site plan review, taking into account potential water quality impacts
- Implement procedures for site inspection and enforcement of BMP control measures
- These BMPs go into effect September 8, 2007

Ordinance Requirements Pertaining to Construction Sites

- Permitting
- Local Ordinance Requirements

Permitting Required by Ordinance

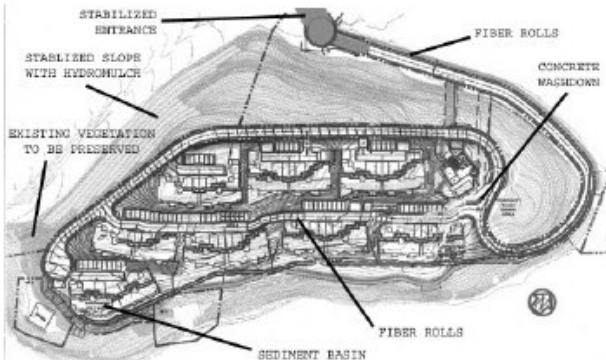
- Projects disturbing 1 or more acres of soil must obtain coverage under the SWRCB's "General Permit for Discharges of Storm Water Associated with Construction Activity" (1998 – new draft now being circulated)
- Such construction activities include clearing, grading and disturbances to the ground such as stockpiling, or excavation
- Permitting under the General Permit is handled by the SWRCB [Sacramento (916) 341-5537], with local enforcement handled by the RWQCB [San Luis Obispo (805) 549-3334]
- Website for detailed info regarding the General Permit, as well as templates for preparing an SWPPP, are:
 - <http://www.swrcb.ca.gov/stormwtr/docs/finalconstpermit.pdf>
 - <http://www.cabmphandbooks.com/Construction.asp#SWPPP>

SWRCB General Permit Requirements

The General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP), which must contain:

- Site map showing proposed construction to be performed, storm water collection and discharge points, and drainage patterns across the site.
- List of BMPs to be used to protect storm water runoff
- Visual monitoring program (site inspections)
- Chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs
- Sediment monitoring plan if the site discharges directly to a sediment-impaired water body

EXAMPLE OF AN SWPPP SITE MAP SHOWING BMPs & OTHER FEATURES



Local Ordinance Requirements

- Any project subject to the SWRCB's General Permit must comply with all provisions of such permit
 - Proof of compliance with the General permit is required in a form acceptable to the Public Works Director
- The City will adopt a separate "*BMP Guidance Series*" containing required BMPs to reduce pollutants in storm water runoff from construction activities
 - These requirements form the core of the construction-related MRSWMP requirements
 - Will be included in any construction or building-related permits that the City issues

BMP Guidance Series for Construction Sites

- BMPs grouped under these categories:
 - Construction Site Planning
 - Erosion and Sediment Control
 - General Site and Materials Management
- At a minimum, every construction site must employ the applicable BMPs listed in the BMP Guidance Series
- Additional BMPs are to be employed as applicable and practicable to prevent pollutants from entering stormwater runoff

Some Principle Construction Site Planning BMPs

- Remove existing vegetation only when absolutely necessary
- Avoid excavation and grading during wet weather
- Prepare to winterize construction site



Erosion and Sediment Control BMPs

- Soil Cover
- Tracking Control (keeping mud and debris from being tracked off the site)
- BMPs to Capture Sediment
- Other Controls (as required)

Soil Cover BMPs

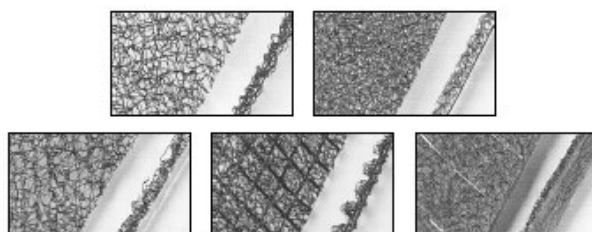
- Install cover materials such as vegetative debris, mulch, crushed stone, geotextile fabric, erosion control blankets
- Use soil stabilizers as appropriate
- Use temporary seeding and planting to reduce erosion potential

Erosion Control Blankets

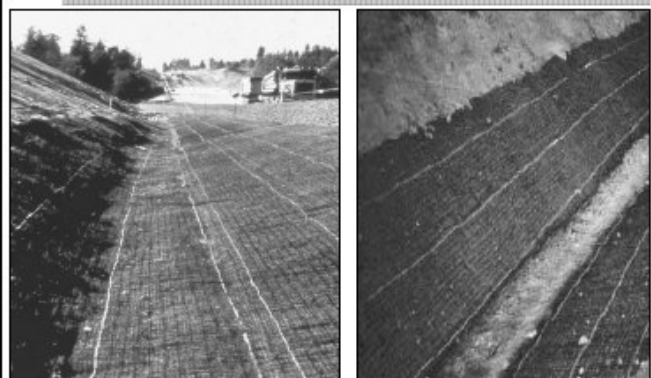


Erosion Control Blankets

Nylon Blankets



Properly Employed Erosion Control Blankets



Improperly Employed Erosion Control Blankets



Proper Application of Straw Mulch



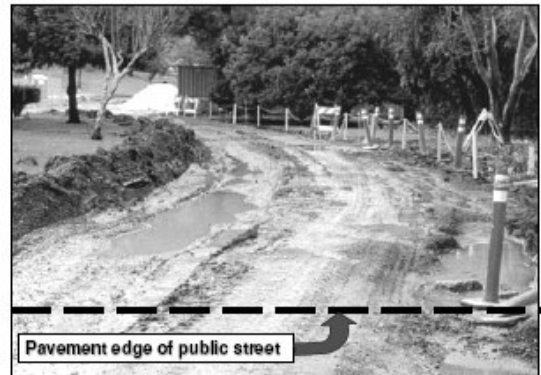
Proper Use of Hydroseeding



Tracking Control BMPs

- Construct stabilized access roads and entrances
- Construct entrance/exit tire wash
- When cleaning paved areas on construction sites, use dry sweeping methods where possible
 - If water must be used to flush pavement, collect runoff in temporary storage tanks to settle out sediments prior to discharge to the storm drains, and protect storm drain inlets

Unstable Site Exit



Stabilized Site Exit



BMPs to Control and Convey Runoff

- Earth dikes, drainage swales and ditches
- Slope drains and subsurface drains
- Velocity dissipation devices
- Flared culvert end sections
- Check dams

Erosion Caused by Lack of Energy Dissipaters



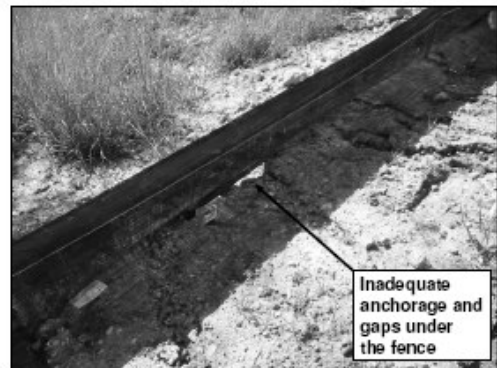
Properly Installed Energy Dissipater



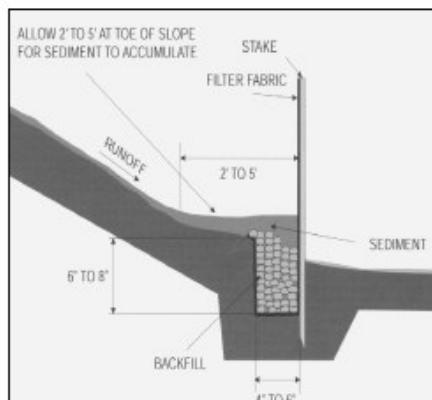
BMPs to Capture Sediment

- Use terracing, riprap, sand bags, rocks, straw bales, and/or temporary vegetation on slopes to reduce runoff velocity and trap sediments (do not use asphalt rubble or other demolition debris for this purpose)
- Protect storm drain inlets from sediment-laden runoff
- When dewatering the site, remove sediment from the discharge (mobile units specifically designed for construction site dewatering can be rented for this purpose)
- Some other controls include:
 - Silt fence
 - Straw bale barrier
 - Temporary sediment basin

Improperly Installed Silt Fencing



Proper Installation of Silt Fencing



Improper Use of Hay Bales



Contractor intended these to prevent erosion and to capture sediments

Actual effect: Erosion and sediment runoff



Correct Uses of Hay Bales

Strengthen Silt Fence

Apply as Mulch

Build Concrete Washout



Effective Uses of Fiber Rolls



Ineffective Use of Fiber Rolls



Improper Use of Sand Bags

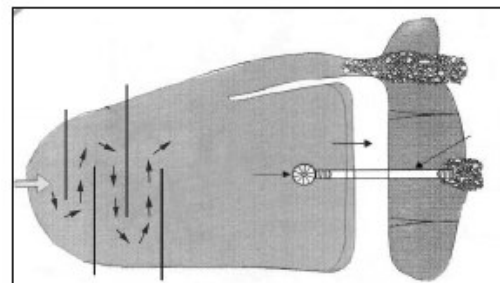


Instead Use Gravel Bags



Properly Designed Sediment Basins

- ❖ Elongated
- ❖ Has Baffles
- ❖ Outlet Structure
- ❖ Overflow Structure



Properly Constructed Sediment Basin



Settling Tank



Filtration



General Site and Materials Management BMPs

- All Construction Sites
- Construction Projects Involving Paint Work
- Construction Projects Involving Cement and Concrete Work
- Construction Projects Involving Roadwork/Pavement Construction

Some of the Principle General Site and Materials Management BMPs Required of All Construction Sites

- Identify all storm drains and prevent pollutants from entering them
- Clean up leaks, drips, and other spills immediately using dry cleanup methods
- Wash vehicles at an appropriate off-site facility. If not feasible, prevent wash water from entering the storm drain
- Use berms and ditches to avoid contaminating clean runoff from areas adjacent to the site
- Cover exposed piles of soil, construction materials and wastes with plastic sheeting or temporary roofs.
- Dispose of all wastes properly and offsite

Proper Use of Temporary Cover



Improper Use of Temporary Cover

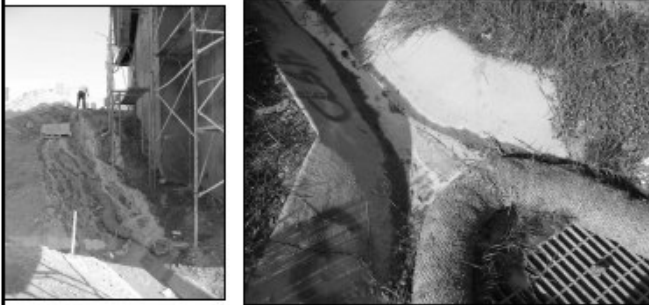


For Construction Projects Involving Paint Work

- Sweep up and properly dispose of paint chips and sand blasting debris
- When performing cleaning with high-pressure water, keep runoff out of storm drain inlets - if allowed by local wastewater authority, collect and discharge to the sanitary sewer
- Never clean brushes or rinse paint containers into a street, gutter, storm drain, or creek
- Properly dispose of unused thinners, residues, and paints
- Dried latex paint may be disposed of in the garbage

Example of Construction Storm Water Enforcement Action by the RWQCB

10/28/2003 - Discharge of paint wash water, \$12,500.



For Construction Projects Involving Cement and Concrete Work

- Avoid mixing excess amounts of fresh concrete or cement mortar on-site
- Store dry and wet materials under cover, protected from rainfall and runoff
- Wash out concrete transit mixers only in designated wash-out areas with proper disposal of washout water – after settling out the solids, if allowed by local wastewater authority, collect and discharge to the sanitary sewer
- Never dispose of washout into the street, storm drains, drainage ditches, or creeks
- Whenever possible, return contents of mixer barrel to the yard for recycling
- Dispose of small amounts of excess concrete, grout, and mortar in the trash

For Construction Projects Involving Roadwork/Pavement Construction

- Perform paving and seal coating only during dry weather
- Cover storm drain inlets and manholes when performing paving and seal coating
- Park paving machines over drip pans or absorbent materials - they tend to drip continuously
- When saw-cutting pavement cover each storm drain inlet with filter fabric and contain the slurry – properly dispose of the residue offsite
- Keep water used to wash down exposed aggregate concrete out of the storm drain
- Do not wash sweepings from exposed aggregate concrete into a street or storm drain
- Recycle broken concrete and asphalt

Components of Good Housekeeping

- Timing
- BMP Maintenance
- Concrete Washout
- Street Sweeping
- Containment
- Waste Management
- Water Conservation
- Prevent Non-Stormwater Discharges

Timing



BMP Maintenance



Example of Construction Storm Water Enforcement Action by the RWQCB

12/5/2003 - Failure to implement an effective combination of erosion and sediment control measures, \$58,500.

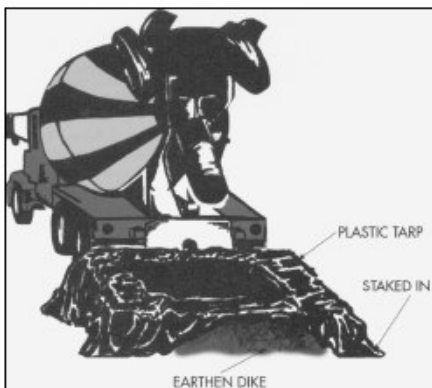


Example of Construction Storm Water Enforcement Action by the RWQCB

12/5/2003 - Failure to maintain erosion and sediment control measures, \$135,000 plus \$30,000 for a third party to monitor the site and report to the Regional Board for the duration of the project.



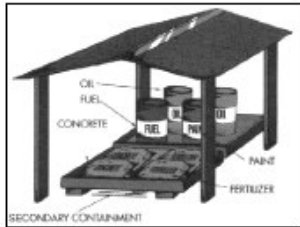
Concrete Washout



Street Sweeping



Use Proper Containment



Inadequate Containment



Poor Waste Management



Avoid Non-Stormwater Discharges



Regularly Inspect Your Best Management Practices

- Design
- Installation
- Maintenance
- Effectiveness

Areas to Examine in Your Inspections Include:

- Storage areas
- Active disturbed soil areas
- Site entrance/exit
- Storm drains
- Areas of applied vegetation
- Disposal areas

Questions and Answers